HITACHI

SERVICE MANUAL

TK | No.3188E

VT-M728E
(DS, SW, SWM, AU, AUB)

Technical Data

SPECIFICATIONS

Format:	VHS PAL Standard
Recording:	Rotary Two-Head Helical Scan Azimuth Recording
Tape Speed:	23.39 mm/sec.
Tape Width:	12.7 mm
Operation Temperature:	5°C to 40°C
Video:	PAL & MESECAM colour (system B & G)
Recording Time:	240 min. (with E-240 cassette)
Aerial Input:	VHF channels 2 – 12 [For DS, SW, SWM] VHF channels 0 – 11 [For AU, AUB] CATV channels S1 – S20 [For DS] UHF channels 21 – 69 [For DS, SW, SWM] UHF channels 28 – 63 [For AU, AUB]
RF Output:	UHF channels 37 (34 – 42 adjustable) (System G) [For SW, SWM] UHF channels 37 (34 – 42 adjustable) [System G or I] [For DS] UHF channels 0 or 1 [System B] [For AU, AUB]
Video Input:	0.5 to 1.5V p-p 75 ohm Unbalanced
Video Output:	1V p-p 75 ohm Unbalanced
S/N Ratio (Video):	43 dB
S/N Ratio (Audio):	43 dB
Horizontal Resolution:	Colour 260 lines
Audio Input:	–8 dBm 50 Kohm
Audio Output:	–8 dBm 1 Kohm
Audio Frequency Range:	70 Hz to 12 kHz
Fast Forward/Rewind Time:	About 7 minutes (with E-240 cassette)
Power:	AC 100–110V/115–127V/200–220V/230–250V, 50/60 Hz [For DS, SW, SWM] AC 240, 50 Hz [For AU, AUB]
Power Consumption:	23W (including timer)
Timer:	12 hour digital indication
Cabinet Size:	370 mm(W) x 89 mm(H) x 320 mm(D)
Weight:	5.4 kg
Accessory Included:	1 – Aerial cable 1 – Infrared remote control unit 1 – Power socket adapter 2 – Batteries

* Design and specifications are subject to change without notice.

VHS

This video deck is a VHS type video recorder. For proper operation, only the VHS type cassette must be used.

MANUALS RELATED TO THE VT-M728E(DS,SW,SWM,AU,AUB)

Name of Manual	Language	Manual No.	Chapters included
Technical Data	English	3188E	Chapters 1-6
Technical Information	English	3185E	——

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

VIDEO CASSETTE RECORDER

November 1989 TOKAI WORKS

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SAFETY PRECAUTIONS

The following precautions should be observed when servicing.

1. Since many parts in the unit have special safety-related characteristics, always use genuine Hitachi replacement parts. Especially critical parts in the power circuit block should not be replaced with other makers' parts! Critical parts are marked ⚠ in the schematic diagrams.
2. Before returning a repaired unit to the customer, the servicing technician must thoroughly test the unit to assertain that it is completely safe to operate without danger of electrical shock.

VT-M728E(DS) / VT-M728E(SW), (SWM) / VT-M728E(AU), (AUB) FEATURE TABLE

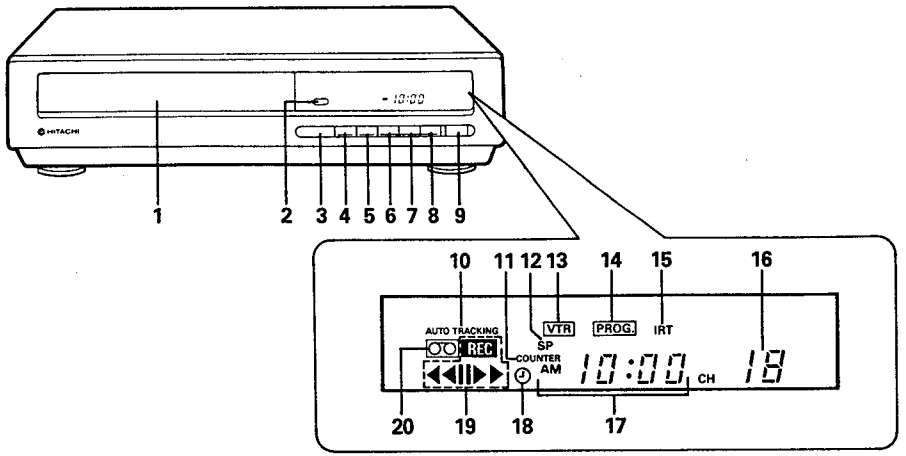
	ITEM	VT-M728E(DS)	VT-M728E(SW), (SWM)	VT-M728E(AU), (AUB)
GENERAL	VIDEO HEADS	2 HEADS (SP : 57 μm)	2 HEADS (SP : 57 μm)	2 HEADS (SP : 57 μm)
	BASIC CHASSIS TYPE	ZA	ZA	ZA
	CAPSTAN DRIVE	DIRECT DRIVE	DIRECT DRIVE	DIRECT DRIVE
	CYLINDER MOTOR	THREE-PHASE OUTER ROTOR : 360Hz	THREE-PHASE OUTER ROTOR : 360Hz	THREE-PHASE OUTER ROTOR : 360Hz
	POWER SUPPLY	AC100 - 110V, AC115 - 127V, AC200 - 220V, AC230 - 250V 50/60Hz	AC100 - 110V, AC115 - 127V, AC200 - 220V, AC230 - 250V 50/60Hz	AC240V, 50Hz
VIDEO	PAL COLOUR	I/B/G	B/G	B/G
	MESECAME COLOUR	YES	YES	NO
	FRENCH SECAME	NO	NO	NO
TUNER	TUNING SYSTEM	V.S TUNING	V.S TUNING	V.S TUNING
	CATV	YES	NO	NO
	CHANNEL PRESET No.	99CH	99CH	99CH
	RF CONVERTER	G/I	G	B
	RF CONV. CHANNEL (34-42)	37	37	0/1
	CHANNEL PRESET BY VTR	YES	YES	YES
TIMER	REC. PROGRAM	8 PROG./1 YEAR	8 PROG./1 YEAR	8 PROG./1 YEAR
	DIMMER	NO	NO	NO
	NEW IRT	NO	NO	NO
	BACK-UP TIMER	MORE THAN 30 MIN.	MORE THAN 30 MIN.	MORE THAN 30 MIN.
DISPLAY	TIME (24, AM/PM)	AM/PM	AM/PM	AM/PM
	PROGRAM REVIEW	OSD	OSD	OSD
	OSD FEATURE LIST	YES	YES	YES
	COLOUR OSD	NO	NO	NO
OTHER FEATURE	COUNTER MEMORY	YES	YES	YES
	OPERATE OFF EJECT	YES	YES	YES
	TV/VTR CONTROL	NO	NO	YES
	AUTO HEAD CLEANER	YES	YES	YES
AUTO FEATURE	DIGITAL TRACKING	YES	YES	YES
	AUTO TRACKING	YES	YES	YES
	AUTO OPERATE ON	YES	YES	YES
	AUTO PLAY	YES	YES	YES
	AUTO EJECT	YES	YES	YES
	AUTO REWIND	YES	YES	YES
	AUTO REW. SHUT OFF	YES	YES	YES
	AUTO TAPE CANCELLER	YES	YES	YES
REMOTE CONTROL	PROGRAM SETTING	OSD	OSD	OSD
	CLOCK SETTING	OSD	OSD	OSD
	VTR 1/VTR 2	NO	NO	NO
	PROGRAM MEMORY	NO	NO	NO
	SP/LP KEY	NO	NO	NO
	TV/VTR KEY	NO	NO	YES

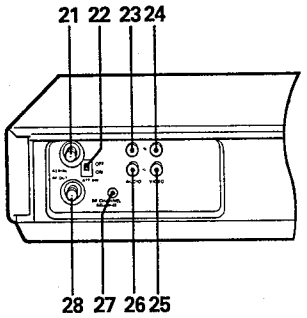
MAIN CONTROL ICs TABLE

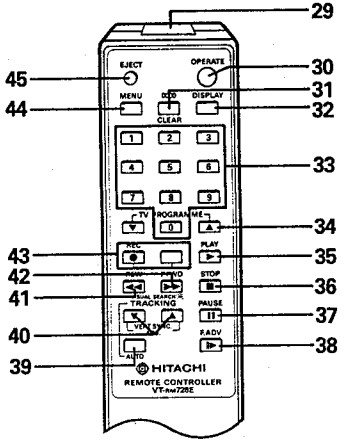
ITEM	VT-M728E(DS)	VT-M728E(SW), (SWM)	VT-M728E(AU), (AUB)
VIDEO SYSTEM			
Y PROCESS	HT7207C (IC201)	HT7207C (IC201)	HT7207C (IC201)
CCD DELAY	MSM6965R (IC202)	MSM6965R (IC202)	MSM6965R (IC202)
CHROMA PROCESS	M52057FP (IC301)	M52057FP (IC301)	M52057FP (IC301)
SECAM DETECT.	XRA7025L (IC351)	XRA7025L (IC351)	———
PRE AMP			
VIDEO HEAD AMP	BA7252S (IC1P)	BA7252S (IC1P)	BA7252S (IC1P)
ON SCREEN DISPLAY			
OSD μP	μPD6450C (IC1401)	μPD6450C (IC1401)	μPD6450C (IC1401)
AUDIO			
REC/PB AMP	LA7297 (IC401)	LA7297 (IC401)	LA7297 (IC401)
SERVO			
SERVO CONTROL	HD49747NT (IC601)	HD49747NT (IC601)	HD49747NT (IC601)
FG AMP	BA6993 (IC602)	BA6993 (IC602)	BA6993 (IC602)
SYSTEM CONTROL / TIMER			
SYSTEM CONTRL / TIMER μP	CXP50112-110Q (IC751)	CXP50112-110Q (IC751)	CXP50112-110Q (IC751)
TAPE LOADING DRIVE	XRA6209U4 (IC753)	XRA6209U4 (IC753)	XRA6209U4 (IC753)
CH-TUNING SYSTEM			
TUNING INTERFACE	LA7938 (IC1501)	LA7938 (IC1501)	LA7938 (IC1501)
AUTO TRACKING			
AUTO TRACKING μP	M50925-442SP (IC901)	M50925-442SP (IC901)	M50925-442SP (IC901)
POWER SUPPLY			
5V REGULATOR	RC78M05E (IC851)	RC78M05E (IC851)	RC78M05E (IC851)
12V REGULATOR	RC78M12FA (IC852)	RC78M12FA (IC852)	RC78M12FA (IC852)

This service manual shows instructions on use of the SW model.
Refer to the instruction manuals of each destination for details.

CONTROLS AND FUNCTIONS







1. **Cassette compartment**
   Insert a cassette through the door, and loading will be completed automatically.
   Note: Power is turned on automatically when a cassette is loaded.
2. **HEAD CLEANING button**
   Press this button to manually clean the video heads when the dirt cannot be removed by auto cleaning.
3. **Infrared ray receiving section**
   Receives infrared rays from the remote control unit.
4. **OPERATE switch**
   Turn the system power on and off.
5. **STOP/EJECT button**
   If this button is pressed, while the set is operating, the running of tape stops and all operating modes are cancelled (except for timer recording). The cassette is ejected, when this button is pressed again in STOP mode.
   Note: Power may be on or off when removing the cassette.
6. **REW (rewind) button**
   Press to start rewind.
   Press this button during playback and reverse playback picture can be viewed at high speed.
7. **PLAY button**
   Press to start play.
   Note: When a cassette (with its erase prevention tab removed) is loaded, playback starts automatically.
8. **F.FWD (fast forward) button**
   Press to activate fast forward.
   Press this button during playback and forward playback picture can be viewed at high speed.
9. **REC/IRT button**
   Press the REC button once to start recording.
   Pressing again lets you select a recording time within 4 hours. After recording for the preset time, the VTR will automatically shut off. This is convenient when you go out during recording.
10. **AUTO TRACKING indicator**
    When a cassette tape is inserted and playback is started, the auto tracking function operates automatically so the picture is optimized. This indicator flashes while tracking is being adjusted and lights steadily when adjustment is complete.
11. **COUNTER indicator**
    Will light when you select the tape counter mode in the VTR's display by pressing the DISPLAY button.
12. **SP indicator**
    Will light when the VTR power is turned on. Shows the tape speed.
13. **VTR indicator**
    Will light when the VTR power is turned on.
14. **PROG indicator**
    Lights if any programme is in the timer.
15. **IRT indicator**
    Appears when REC button is pressed twice or more for setting the IRT.
16. **TV station number display.**
    This shows the TV station number corresponding to the station selected.
17. **Clock display**
    Shows the present time or tape counter.
18. **Timer indicator**
    Will light when turning power off after programming.
19. **Mode indicators**
    - "▷" appears during the playback mode.
    - "REC" appears during the record mode.
    - "◁◁" appears during the rewind mode and rewind visual search mode.
    - "▷▷" appears during the fast forward mode and forward visual search mode.
    - "▯▯" appears during the play/record pause mode.
20. **TAPE-IN indicator**
    Lights when cassette is loaded in the compartment.
21. **AERIAL input socket**
    Connect an external aerial.
22. **Attenuator switch**
    Generally set to the OFF position.
    Set to "ON" when interference occurs in an area with a strong signal.
23. **AUDIO IN**
    Receives audio signals from a camera, external sound equipment or from another VTR.
24. **VIDEO IN**
    Receives video signals from a camera, or another VTR.
25. **VIDEO OUT**
    Permits video connection of your unit to a monitor or another VTR.
26. **AUDIO OUT**
    Permits audio connection of your unit to a monitor or another VTR.
27. **RF CHANNEL control**
    Used to adjust the video channel correctly.
28. **RF OUT socket**
    Connect to TV aerial input.
29. **Transmission window**
    Transmits commands to the VTR.
30. **OPERATE button**
    Same as OPERATE button on the VTR (turns operate on/off).
31. **CLEAR/0000 button**
    Used for programming the timer. And also used for counter reset button when the tape counter is displayed in the VTR's display.
32. **DISPLAY button**
    1st Press .... Calls up the mode display on TV screen.
    2nd Press .... Defeats the display function. Also changes the VTR's display from the clock to the tape counter.
33. **Number buttons "0" through "9"**
    Select any channel by pressing two buttons. (Press "0" and then "8" for TV station 8.) The number buttons are also used for setting the clock and programming the timer.
34. **TV PROGRAMME buttons**
    Select the TV programmes you wish to view or record by pressing these buttons.
35. **PLAY button**
    Press to start play.
    Note: When a cassette (with its erase prevention tab removed) is loaded, playback starts automatically.
36. **STOP button**
    The STOP button must be pressed between "RECORD" and any other operation.
37. **PAUSE button**
    Press to pause during recording.
    Press to view a still picture during playback
    Press again to release.
38. **FRAME ADVANCE button**
    Press to view tape one frame at a time.
    Operates only after PAUSE button has been pressed.
39. **AUTO TRACKING button**
    When playback is started, the auto tracking function operates normally if this button is not pressed. When this button is pressed after tracking has been adjusted manually, auto tracking operates again.
40. **TRACKING control buttons**
    To minimize noise in playback. May also be used during visual search to move the noise bars up or down on the screen.
41. **REW (rewind) button**
    Press to start rewind.
    Press this button during playback and reverse playback picture can be viewed at high speed.

42. F.FWD (fast forward) button
Press to activate fast forward.
Press this button during playback and forward playback picture can be viewed at high speed.

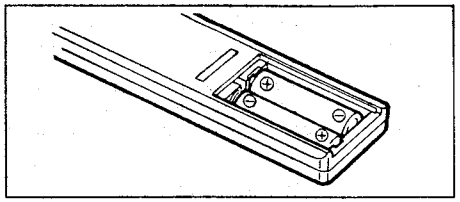
43. REC buttons
Press two REC buttons at the same time to start recording.

44. MENU button
When setting the clock, programming the timer and presetting channels, etc., press this button and follow the operating procedure displayed on the TV screen.

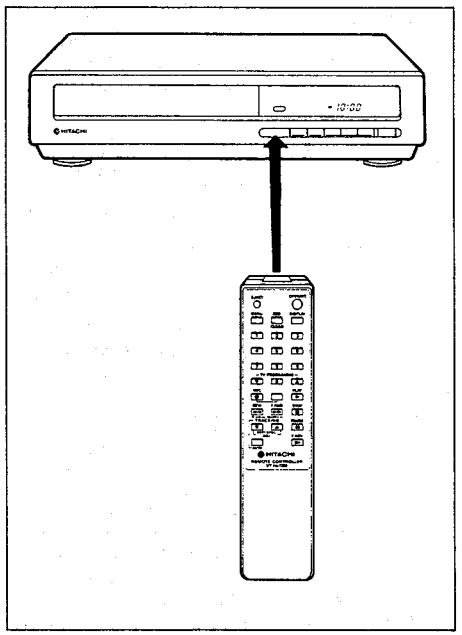
45. EJECT button
When this button is pressed in modes other than recording, the tape stops, and the cassette is ejected.

You can operate the VTR from a distance using the Infrared Remote Control unit which performs the same functions as the corresponding buttons on the VTR.

Power source of infrared remote control unit
The infrared remote control unit is powered by two batteries (size IEC standard R6).



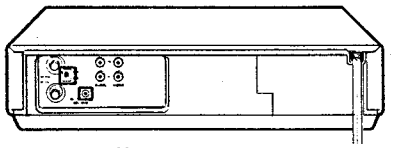
Remote operations
Aim the remote control at the receiver on the front panel of the VTR.



NOTES:
1. If the range is short, try new batteries.
2. An object in between the VTR and remote control unit may block the invisible light beam and operation will not be possilble.

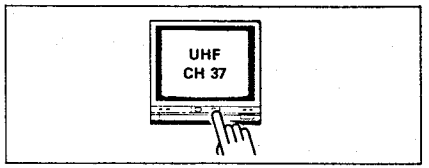
VIDEO CHANNEL SETTING

The RF converter changes the video and audio signals from a previously recorded video tape during playback to the same type of signal used for TV broadcasts. The RF converter output in this unit is pre-set prior to shipment to UHF channel 37.



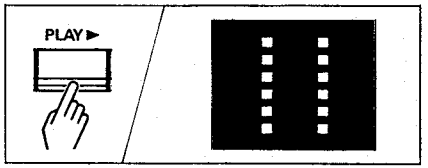
User's controls

1 Turn on TV and set the channel to UHF channel 37.



If your TV has a channel button marked "A/V", you can use this channel instead of UHF channel 37.

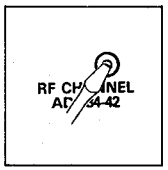
2 Press PLAY button on the VTR with operate switch off.



The test pattern appears on the TV screen.
Fine tune your TV until the test pattern is received clearly.
Now the video channel has been preset.

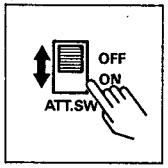
You must always select this video channel with the channel selector of your TV when playing back a tape or viewing a TV programme selected with the TV PROGRAMME button of the VTR.

NOTE:
If it is not possible to correctly tune to the test pattern or channel 37 is used for broadcasting in your area, adjust the RF converter output with the RF channel control using a small screwdriver and readjust your TV until the test pattern is observed.



When connecting the VTR to a TV set provided with auto-tuning and the video channel cannot be set, operate as follows:
1. Remove the aerial cable from the AERIAL terminal of the VTR.
2. Press PLAY button on the VTR with operate switch off.
3. Press the Auto-tuning button of the TV.
4. Auto-tuning starts and it stops at UHF channel 37. The test pattern appears on the TV screen.
   Note: The auto-tuning indicator of the TV set changes to an exact tuning indicator.
5. Set the channel memory of the TV to ON and store the channel which was set in item 4.
   Now, the video channel of the TV has been set properly.
6. Reconnect the aerial cable to the VTR.

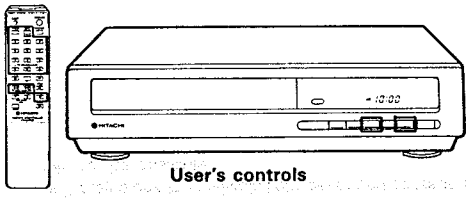
ATTENUATOR SWITCH



The ATTENUATOR switch located on the rear panel of the VTR is used to adjust the reception of the signal from the tuner section.
If the wavy lines appear in the picture during the reception of a broadcast from a near-by TV station, it may be that the signal reception is too strong. In this case, set this switch to ON to attenuate the signal.
Normally leave this switch in the OFF position.

PRE-TUNING OF BUILT-IN TV TUNER

This VTR incorporates a complete television tuner with the required tuning controls. Once you have pre-tuned to preferred stations, you can select any of them by merely pressing the TV PROGRAMME button or Number buttons 0 ~ 9.

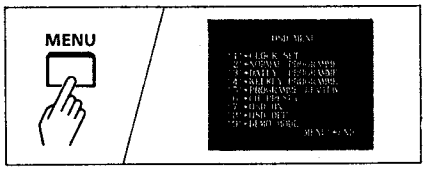


User's controls

1 Turn on the VTR and the TV, then set the TV to the pre-tuned video channel (described on page 8).

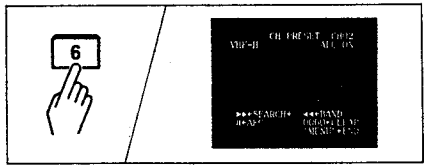
2 Aim the remote control unit at the receiver on the front panel of the VTR.

3 Press the MENU button.



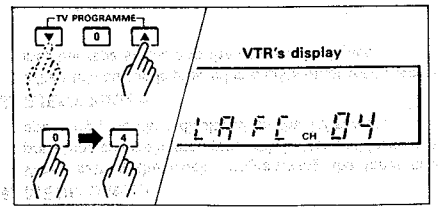
The "menu", as illustrated, will appear on TV screen.

4 Press "6" button for channel setting.



The "channel setting menu", as illustrated, will appear on TV screen. The VTR's display will also change to band indication.

5 Press the TV PROGRAMME or two number buttons "0" ~ "9" to select the station number to be memorized.

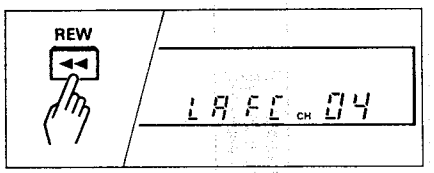


For example, the above diagram shows that the station number 4 has been selected.

Notes:

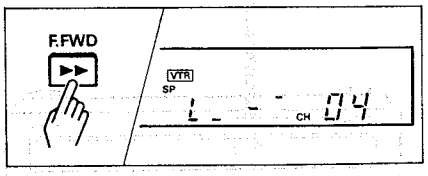
1. Station numbers "00" through "99" can be now selected by pressing the TV PROGRAMME or two number buttons. In this case, you can use any station number.
2. When "AFC" is not displayed in the display, press the PAUSE (AFC ON/OFF) button to display "AFC".

6 Press the REW (BAND) button to select the desired band to be pre-tuned.
If you pre-tune to VHF low stations (2 — 4), select the indication "L". Select "H" for VHF high stations (5 — 12).
Select "U" for UHF stations (21 — 69).



For example, the above diagram shows that VHF Low band "L" has been selected.

7 Press and release the F.FWD (SEARCH) button to start tuning.



The built-in tuner starts searching from the lowest to highest frequencies.
At a station that is broadcasting, the picture appears on the TV screen. If the programme displayed is different from the station to be preset, press the F.FWD (SEARCH) button again.
At the next station, the searching will stop and the new station can be preset. Repeat this until the desired station is reached.

8 Follow the same steps as explained in steps 5 through 7 above for other stations.
You can preset up to 99 stations in memory.

9 After having completed tuning to all required stations, press the MENU button twice.

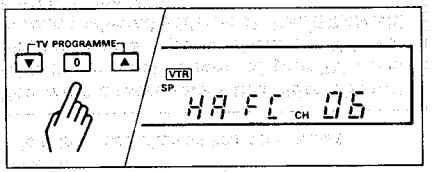
These stations preset in memory as shown in the above can be selected by the TV PROGRAMME or two number buttons "0" through "9".

AFC (Automatic Frequency Control)

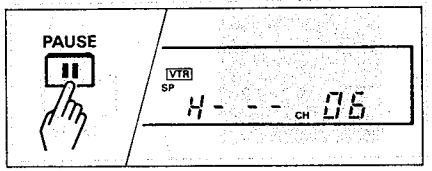
Since this unit has an AFC circuit, when a station is preset following the above procedure, the AFC turns on automatically and you can receive the signal in optimum condition.
If a TV station signal is marginal due to graininess or ghosting, the picture may sometimes be improved by manually tuning for best picture and then defeating the AFC action. To turn AFC off, follow the procedure below.

1 Follow the steps 1 through 4 of "Pre-tuning of built-in TV tuner".

2 Select the station for which you want to turn AFC off by pressing the TV PROGRAMME buttons or two number buttons "0" through "9".

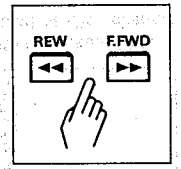


3 Press the PAUSE (AFC ON/OFF) button. "AFC" disappears from the display.



Note: Pressing the button once again will turn the AFC on.

4 Tap on the REW or F.FWD button alternately for fine tuning.



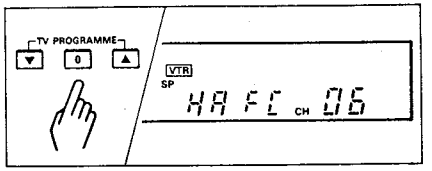
5 Press the MENU button twice to return to TV screen.

Eliminating unwanted preset stations

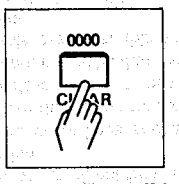
You can rearrange the desired stations by eliminating unwanted preset stations for programme up/down tuning.

1 Follow the step 1 through 4 or "Pre-tuning of built-in TV tuner".

2 Press the TV PROGRAMME or two number buttons until an unwanted station is found.



3 Press the CLEAR/0000 button.



Sound will go off indicating the station has been erased from memory.

4 Repeat steps 2 and 3 until all unwanted stations have been erased.

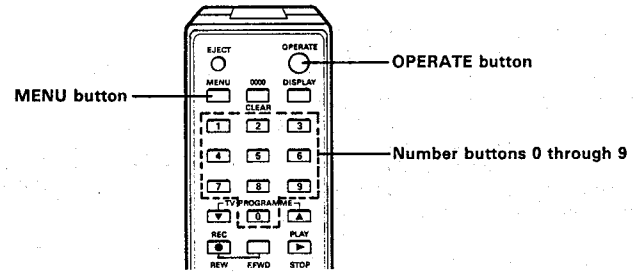
5 After eliminating them, press the MENU button twice to return to TV screen.

Note: To add an erased station to the channel scan list, preset it again.

SETTING THE CLOCK

Things to know before starting

- The clock uses the 12-hour system. (Be aware of AM and PM.)
- When you first plug in your VTR, the clock will read "−−:−−".
- The buttons for setting the clock are on the remote control unit.
- While you are setting the clock, the "menu" display on the TV screen will prompt you through the procedures.
- If you press a wrong digit, press the MENU button and restart the procedure from the beginning.

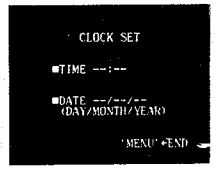


1. Turn on the VTR and TV.
2. Be sure that the TV is set to the video channel.
3. Aim the remote control unit at the receiver on the front panel of the VTR.

4. Press the MENU button. The "menu", as illustrated, appears on the TV screen.

Original menu

5. Press "1" button to set the clock. The display prompts you to set the hour.

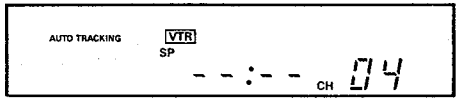


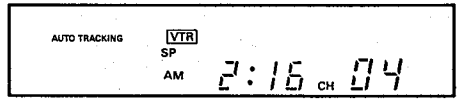
6. Set the hour by pressing two number buttons on the remote control unit and two more for the minute (for example, 0 2 1 6 for 2:16). The display prompts you to select AM or PM.

7. Press "1" for AM or "2" for PM. The display flashes and prompts you to set the date.

8. Set the date by pressing six digits in order of day, month and year (for example, 1 7 0 3 9 0 for 17th of March, 1990). The day of the week will appear when you have entered all six digits for the date.
   NOTE: Always press "0" before single-digit months and days.

9. Press the MENU button to start the clock. The display resumes the "original menu".
   NOTE: Now the display on the VTR will show the correct time.



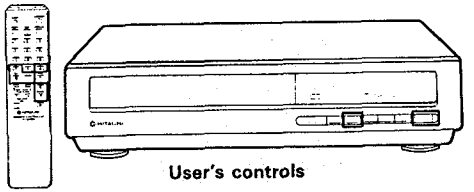


10. Press the MENU button once again to return to the TV screen.

NOTES:

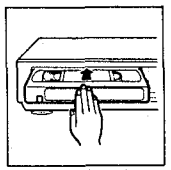
1. If you input an illogical time or date (13th month for example), this will not be accepted.
2. The clock must be set to the correct time before programming the timer for unattended recording or using the Instant Recording Timer (IRT) feature.
3. The display of Clock Setting procedures will resume the "original menu" if not further steps are followed in the setting for about 1 minute.
4. If power is interrupted for more than one minute, "−−:−−" will appear on the display and Timer and Programming will need to be reset.

RECORDING TV PROGRAMMES

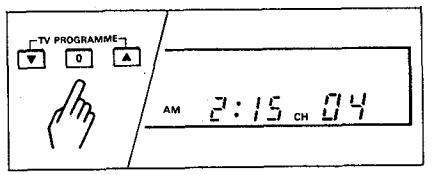


User's controls

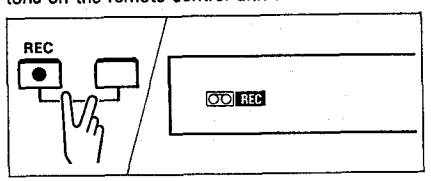
1 Insert a cassette.
Note: Be sure to check that the erase prevention tab is not missing. If it is removed, the VTR is set to playback mode automatically.



2 Select the programme to be recorded by pressing the TV PROGRAMME or two number buttons.

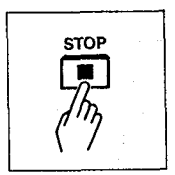


3 Press the REC button on the VTR or two REC buttons on the remote control unit at the same time.



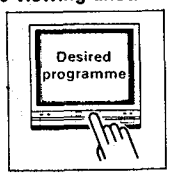
Now, recording starts.

4 After the recording has been made, press the STOP button.



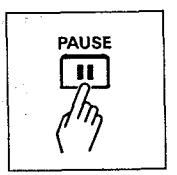
To view a programme while recording it
You can view a programme while recording it by merely selecting the video channel with your TV.

To record one programme while viewing another
You can record one programme while viewing another by merely selecting the programme you want to view on your TV. The recorded programme can be viewed later at your convenience.



Notes:

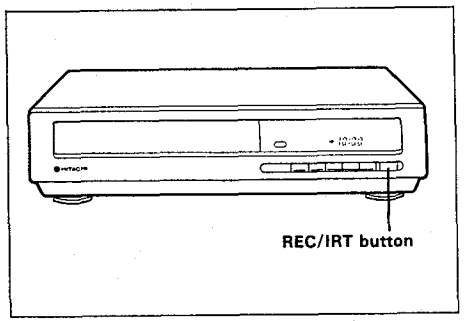
1. If you want to avoid recording unwanted material, press the PAUSE button. Press the PAUSE button again to release the pause mode. To prevent tape damage, do not leave the unit in the pause mode for more than 5 minutes.



2. If you want to change programmes while in the record mode, press the PAUSE button then select the desired programme.
   Press the PAUSE button to release the pause mode.
3. If the cassette in the VTR has its safety tab removed, the VTR will eject it when the REC button is pressed.
4. Your TV does not have to be on to make a recording because the VTR records TV programmes without the aid of your TV. It is only used for monitoring.

INSTANT RECORDING TIMER (IRT)

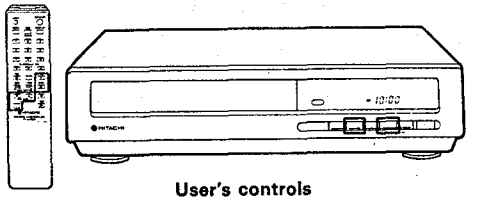
The Instant Recording Timer allows you to make simplified timer recording without using the programme timer.
Be sure that the clock is set to the correct time before IRT.



1. Follow the steps 1 through 3 on "RECORDING TV PROGRAMMES".
2. After recording has started, press REC/IRT button on the VTR once again to indicate the recording time on the display. The time changes in hours and minutes in the order of 0:30, 1:00, 1:30, 2:00, 3:00 and 4:00 every time the button is pressed. The ⏲, IRT and REC indications will come on when the recording time is indicated. During recording, the remaining time is displayed.
3. At the end of recording the display reads "0:00"; the VTR will automatically stop recording and the present time will be displayed.

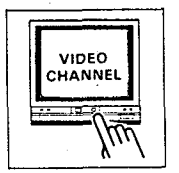
NOTE: To stop the VTR during "IRT", press OPERATE button and then STOP button within 10 seconds.

PLAYBACK

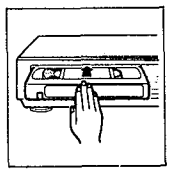


User's controls

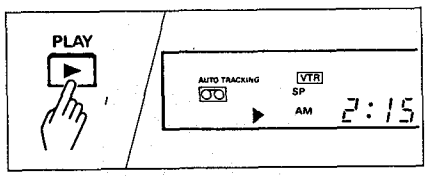
1 Turn the TV on and select the video channel.



2 Insert the cassette.
Note: When the cassette (with its erase prevention tab removed) is loaded, playback starts automatically.

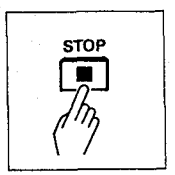


3 Press the PLAY button.



Note: When tape recorded in the LP mode is played back, the LP indicator lights in the VTR's display and the picture and sound are output. Although the picture and sound are occasionally abnormal, it does not indicate a fault.

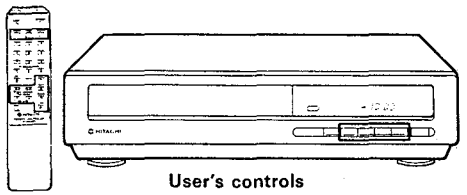
4 Press the STOP button to stop playback.



Auto Tracking
When playback is started, the auto tracking function operates and adjusts tracking automatically so the picture is optimized. "AUTO TRACKING" flashes in the display for several seconds and then changes to steady lighting.

- Auto tracking may not operate correctly when the tape is scratched or the recorded condition is poor. In this case, press the tracking control button (▼ or ▲) to adjust tracking.
- If the AUTO TRACKING button is pressed after operating the tracking control button (▼ or ▲), auto tracking operates again.

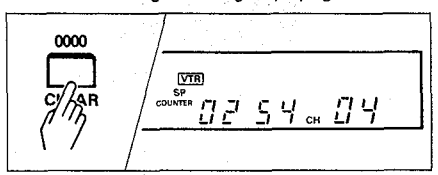
SPECIAL CHARACTERISTICS



User's controls

Tape counter

This indicates the amount of video tape transported as a number. Press the DISPLAY button once or twice to display the tape counter in the display then press the CLEAR/0000 button to set the counter reading to "0000" when starting recording or playing back.

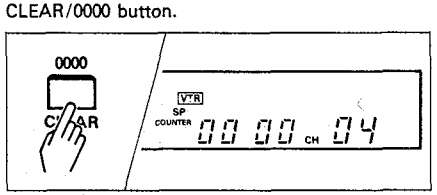


Note the number on the tape counter at the beginning and end of each programme you record. This will allow you to use the counter to find the desired programme later.

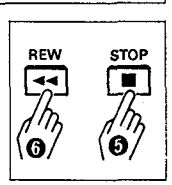
Counter memory function

This is useful if there is a section of tape you want to view immediately after recording or if you want to return to the same point several times.

1. Begin recording or playing back a tape.
2. Press the DISPLAY button once or twice to display the tape counter in the display.
3. At the point where you want playback to begin, reset the tape counter to "0000" by pressing the CLEAR/0000 button.



4. Continue to play or record.
5. Press the STOP button when recording or playback finishes.
6. Press the REW button.



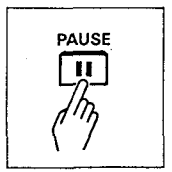
The tape will automatically stop at the position where "0000" was preset.

Actually, so that you won't miss the very first part of the programme, the tape will stop slightly prior to "0000", at a reading of approximately "9997".

Note: The counter memory function will also operate in the fast-forwarding mode.

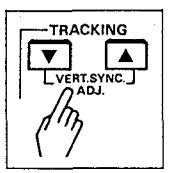
Still playback

Press the PAUSE button to stop the picture on the screen during playback.
Press the PAUSE button again to reset to normal playback or the STOP button to stop the tape.



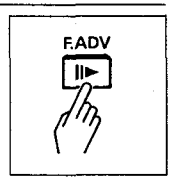
Notes:

- If you see vertical shaking on the TV screen in the still playback mode, press either TRACKING control button (▲ or ▼) to minimize shaking.
- When the still playback mode continues for about 5 minutes, the VTR switches to the stop mode automatically to prevent damage to the tape.
- The playback picture will contain some noise in the still playback mode.



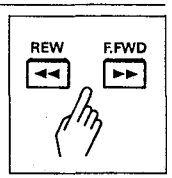
Frame advance

When you hold the F.ADV button down during the still playback mode, tape will be played back frame by frame. It operates only after PAUSE button has been pressed.



Visual search

This allows you to view the played back picture at high speed in both the forward and reverse directions.
Press either the REW or F.FWD button during playback. Pictures can be viewed at high speed in either the forward or reverse direction. Press the button again (or press PLAY) to return to normal playback or press the STOP button to stop tape.

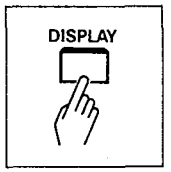


Note: The playback picture will have some horizontal noise bars in the picture.

OSD (On-Screen Display) function

Whenever you turn on your VTR or change the status — from stop to play, play to stop, change stations, etc. — the new status of the VTR is displayed on the TV screen automatically. You can manually call up the VTR status display to the screen when required by pressing the DISPLAY button. The display will disappear from the screen in a few seconds.

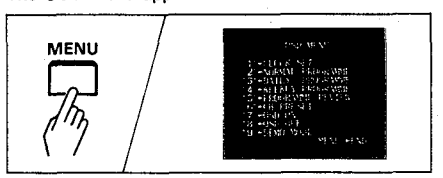
- Press the DISPLAY button once to call up the mode display.
- Press the button twice to clear the mode display and also the VTR's display changes from clock to tape counter or tape counter to clock.



Note: When tapes recorded by other VTRs are played back, the mode display may shake up and down.

If required, follow the procedure below so no display will appear on the TV screen.

1. Press the MENU button on the remote control unit. The OSD menu appears on the TV screen.



2. Press button "8". The OSD function is switched off. When this is selected, no operation mode will be displayed on the TV screen if the VTR is operated.

Note: Press button number 7 in step 2 above when you want OSD to reappear.

OSD effects demonstration

1. If you want to demonstrate OSD effects, press button "9" when the OSD menu is displayed on TV screen.
   The picture demonstrating the OSD effects are each displayed for about 20 seconds.
2. To stop the demonstration, press MENU button.

Automatic rewind

The VTR automatically rewinds the tape when the end of the tape is reached.

Note: To prevent accidental erasure, the VTR does not rewind the tape after timer recording.

Rewind shut off

If the OPERATE switch is pressed during rewind operation, power will be turned off automatically after the tape has been completely rewound.

Note: If the counter memory or index function is turned on, the VTR will stop rewinding and switch off at the specified position.

TIMER RECORDING

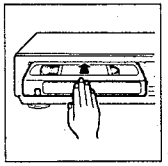
The programmable electronic clock/timer permits the unattended recording of 8 preselected programmes within a period of 1 year, including the same programme(s) repeated on every day and the same programme(s) every week. It turns the unit on and off and selects the programme automatically.

Preparations for timer recording

- Your TV does not have to be on to make a recording because the VTR records TV programmes without the aid of your TV. It is only used for monitoring.

1 Make sure that the clock shows the present time correctly.

2 Insert a cassette.
Be sure to check that the record safety tab is not missing. If the record safety tab is missing, recording will not begin.



3 Programme the timer.
See below.

4 Turn the OPERATE switch off.
If a cassette with its erase prevention tab removed is loaded, it will be ejected automatically when power is turned off. In this case, insert a cassette with its erase prevention tab in place or cover the hole with tape.

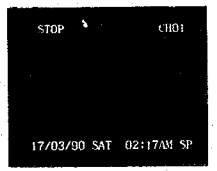
■ Programming the timer for unattended recording

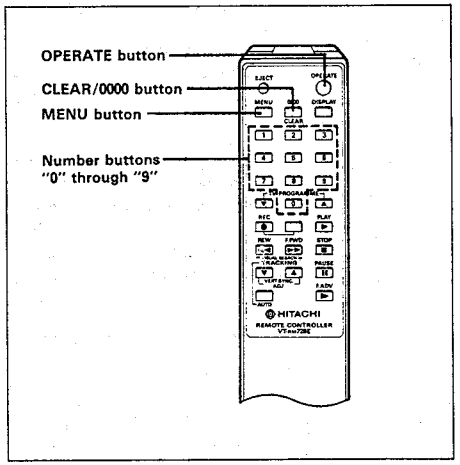
For unattended recording the timer needs to know what **day** to make the recording, the **time to start**, the **time to stop**, and the **channel to be recorded**.

Things to know before starting

- While you are programming the timer, the "menu" display on the TV screen will prompt you through the procedures.
- You can correct an error in the programme any time before the last step by pressing CLEAR/0000 button repeatedly until the digit to be corrected becomes flashing and then enter the correct digit.
- The programming will automatically resume the "original menu" if no further steps are followed in programming for about 1 minute.
- The "original menu" will be switched to the TV screen automatically if it is left on without further steps for about 1 minute.

1. Turn on the VTR and TV.
2. Be sure that the TV is set to the video channel.
3. Aim the remote control unit at the receiver on the front panel of the VTR.





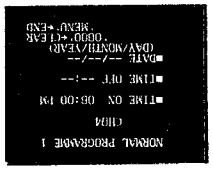
4. **Press the MENU button.** The "menu", as illustrated, appears on the TV.

- for recording up to 8 programmes on a single day or over the days within a period of 1 year.
- for recording up to 8 programmes at the same time(s) Sunday through Saturday within a period of 1 year.
- for recording up to 8 programmes on certain days of every week within a period of 1 year.

Note: Any one of these programme modes or any combination thereof (up to 8 programmes in total) may be selected. A typical example of a "Normal" programme is demonstrated below.

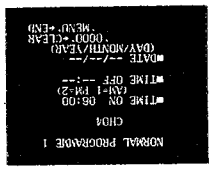
5. Press button "2". The display will prompt you to select the channel to be recorded.

6. Press two digits for the channel to be recorded (for example, "0" "4" for channel 4). The display will prompt you to enter the recording start time.

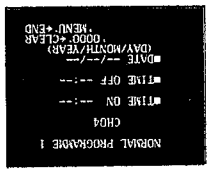


7. Press four digits, two for the hour and two more for a minute (for example, "0" "6" "0" "0" for 6:00). The display will prompt you to select either AM or PM.

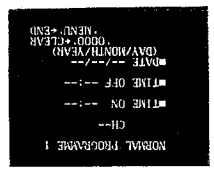
   Note: Always press "0" before a single digit hour and minute.



8. Press "1" for AM or "2" for PM. The display will prompt you to select the stopping time.



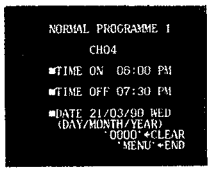
9. Press four digits, two for the hour and two more for the minute (for example, "0" "7" "3" "0" for 7:30). The display will prompt you to select either AM or PM.



TIMER RECORDING (cont)

10. Press "1" for AM or "2" for PM. The display will prompt you to select the date.

11. Press four digits (two for the day and two for the month) (for example, "2" "1" "0" "3" for begin recording on 21th of March). The year and day of the week are displayed automatically.



12. Press the MENU button to enter your programme and return to the programming "menu" display. Additional programmes may be entered by repeating Steps 5 through 12.
If you have no other programmes to enter, press the MENU button once again.
The display returns to the TV screen.

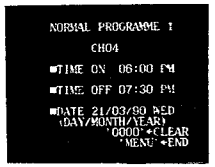
13. Press OPERATE button to turn off the VTR power.

NOTE:
You can preset up to eight programmes. If you attempt to input a ninth programme, the following display appears on the TV screen showing that you cannot enter the programme.

RECALLING THE PROGRAMME

1. Follow Steps 1 through 4 of "Programming the timer for unattended recording".
The programming "menu" appears on the TV screen.

2. Press "5" button (Programme Review).
The TV screen will display for 10 seconds the information you entered for the lowest programme number. Then the display changes to the next higher programme number and so on, until all programme information has been displayed.
3. Press "5" again if you want to view the next programme information immediately.
4. When you finish reviewing the programmes, press the MENU button twice to switch off the on-screen display.



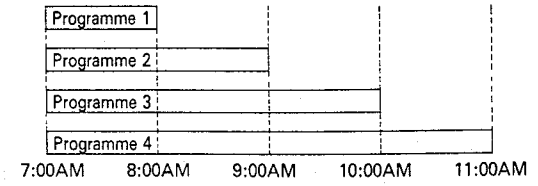
CLEARING ("ERASING") INFORMATION FROM A PROGRAMME

1. Follow Steps 1 through 4 of "Programming the timer for unattended recording" on page 18.
The programming "menu" appears on the TV screen.
2. Press "5" button (Programme Review).
The TV screen will display for 10 seconds the information you entered for the lowest programme number. Then the display changes to the next higher programme number and so on, until all programme information has been displayed.
3. Press "5" again if you want to view the next programme information immediately.
4. Press CLEAR/0000 button when the programme information you want to clear is displayed.
5. Press the MENU button twice to switch off the on-screen display.

Note:
- Normal programme is cleared automatically when the timer recording is finished, but daily and weekly programmes remain in the timer even after the timer recording is finished.

PROGRAMME PRIORITY

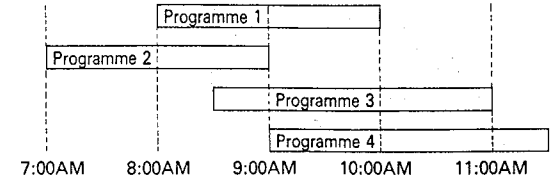
Example 1: When the programme start time is the same among the programmes on the same day, they are recorded in the order of Programme 1, 2, 3 ---- 8.



7:00AM — 8:00AM for Programme 1
8:00AM — 9:00AM for Programme 2
9:00AM — 10:00AM for Programme 3
10:00AM — 11:00AM for Programme 4

Programme 1 is executed as programmed, and Programme 2 as illustrated after Programme 1, and Programme 3 as illustrated after Programmes 1 and 2, and Programme 4 as illustrated after Programmes 1, 2 and 3.

Example 2: When the programmes overlap, an earlier programme has priority.



7:00AM — 9:00AM for Programme 2
9:00AM — 10:00AM for Programme 1
10:00AM — 11:00AM for Programme 3
11:00AM ~ for Programme 4

Programme 2 is executed as programmed, and Programme 1 as illustrated after Programme 2, and Programme 3 as illustrated after Programmes 2 and 1, and Programme 4 as illustrated after Programmes 2, 1 and 3.

DISASSEMBLY

1. IDENTIFICATIONS AND LOCATIONS OF CIRCUIT BOARDS

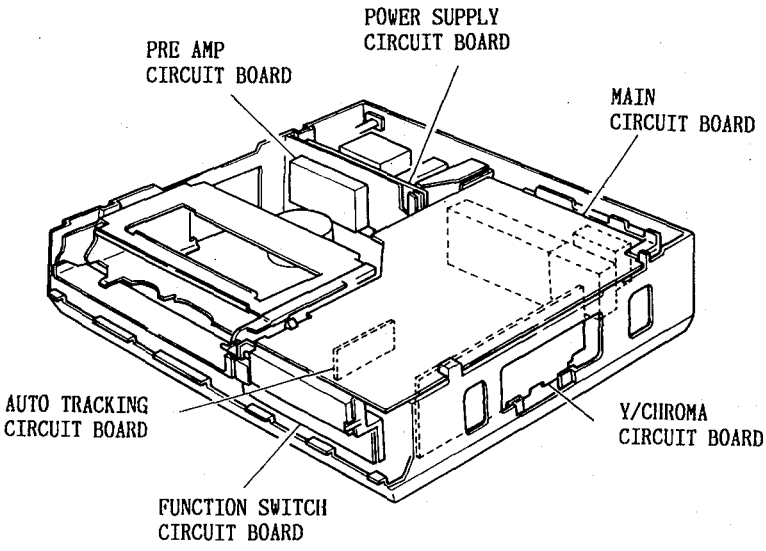


Fig. 1-1 Top View

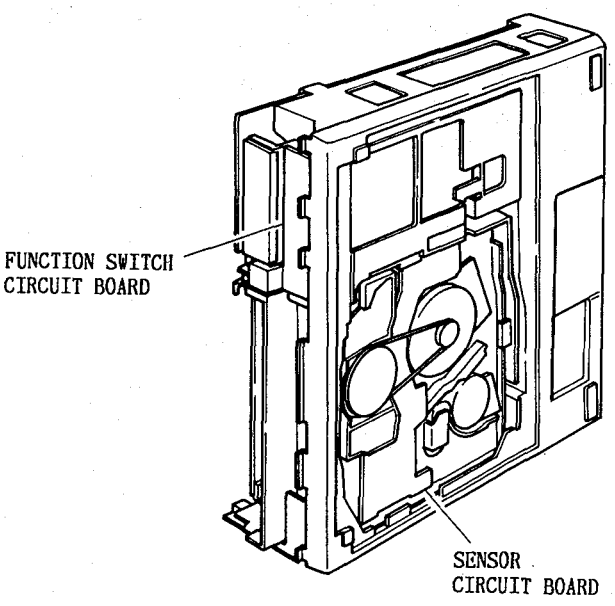


Fig. 1-2 Bottom View

2. IDENTIFICATIONS AND LOCATIONS OF MAIN MECHANICAL COMPONENTS

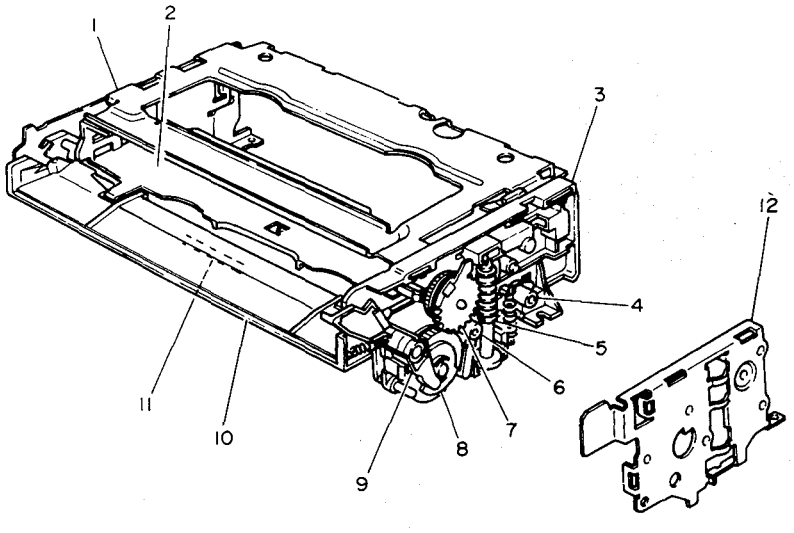


Fig. 2-1 Cassette Loading Mechanism

1. CHASSIS HOLDER
2. CASSETTE HOLDER
3. GEAR BRACKET
4. SWITCH LEVER B
5. FL WORM GEAR
6. SWITCH LEVER A
7. WORM WHEEL
8. DRIVE GEAR
9. DOOR ARM
10. FRONT HOLDER
11. SHAFT PIN
12. CASSETTE DOOR
13. SIDE CHASSIS

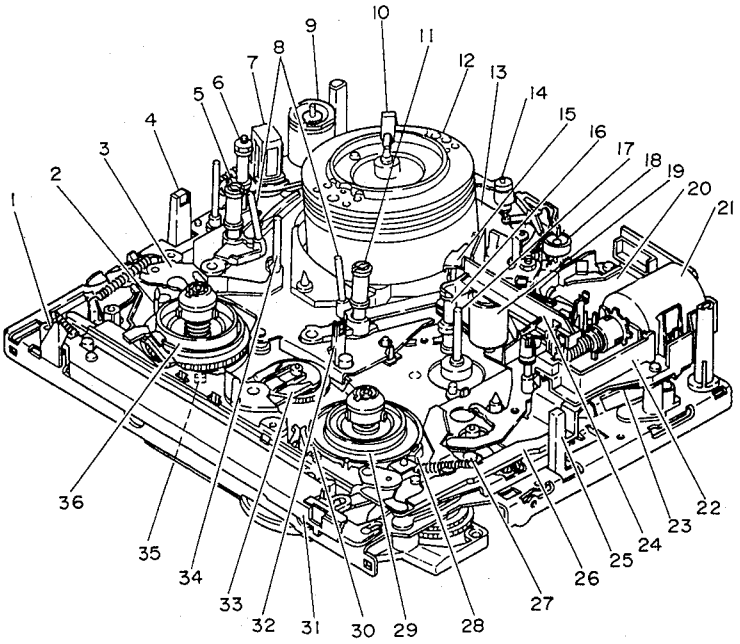


Fig. 2-2 Tape Transport Mechanism -Top View

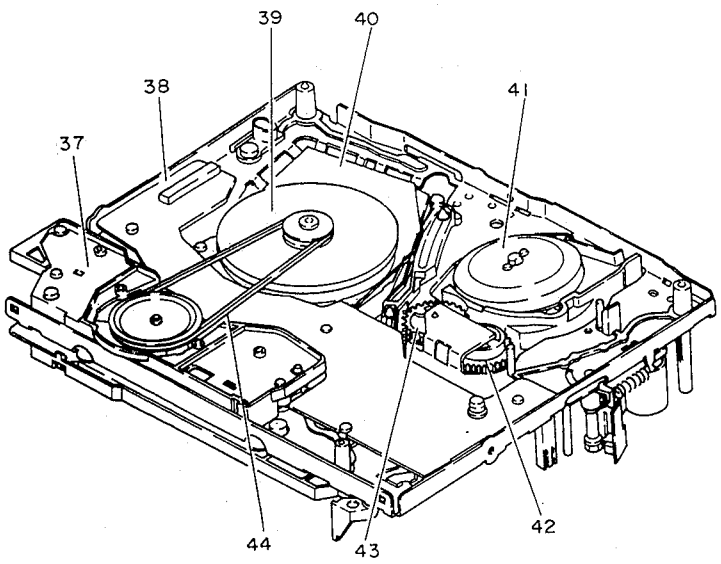


Fig. 2-3 Tape Transport Mechanism -Bottom View

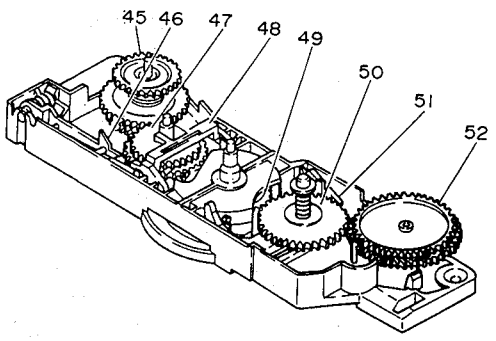


Fig. 2-4 Tape Transport Mechanism - Clutch Base Section

1. SAFETY ARM
2. TENSION BAND ASSEMBLY
3. TENSION ARM
4. SUPPLY REEL SENSOR
5. SUPPLY GUIDE ROLLER
6. SUPPLY GUIDE POLE
7. FULL ERASE HEAD
8. INCLINED GUIDES
9. IMPEDANCE ROLLER
10. STATIC DISCHARGE BRUSH
11. TAKE-UP GUIDE ROLLER
12. CYLINDER MOTOR ASSEMBLY
13. CYLINDER BASE
14. HEAD CLEANING ARM ASSEMBLY (For VT-M728E)
15. AUDIO/CONTROL (A/C) HEAD
16. TAKE-UP GUIDE POLE
17. CAPSTAN SHAFT
18. HEAD CLEANING BRACKET ASSEMBLY (For VT-M728E)
19. PRESSURE ROLLER ASSEMBLY
20. MECHANISM STATE SWITCH
21. LOADING MOTOR ASSEMBLY
22. LOADING MOTOR HOLDER
23. LOAD BRACKET ASSEMBLY
24. CASSETTE LID OPENER
25. TAKE-UP REEL SENSOR
26. BRAKE LINK ARM
27. PRESSURE ROLLER OPERATION ARM
28. TAKE-UP BRAKE ASSEMBLY
29. TAKE-UP REEL DISK
30. TAKE-UP MAIN BRAKE
31. SLIDER BLOCK ASSEMBLY
32. END LAMP
33. REEL DRIVE IDLER
34. TENSION POLE
35. SUPPLY MAIN BRAKE
36. SUPPLY REEL DISK
37. CLUTCH BASE ASSEMBLY
38. SENSOR P.C.B
39. CAPSTAN MOTOR ASSEMBLY
40. CAPSTAN MOTOR P.C.B
41. CYLINDER MOTOR ASSEMBLY
42. SUPPLY LOADING GEAR
43. TAKE-UP LOADING GEAR
44. REEL BELT
45. TAKE-UP GEAR
46. CLUTCH ARM
47. CHANGE GEAR
48. CHANGE ARM
49. TAKE-UP PULLEY
50. FL CHANGE GEAR
51. FL CHANGE ARM
52. RELAY GEAR

3. CASE REMOVAL

1. Top Cover
2. Bottom Cover
3. Front Panel

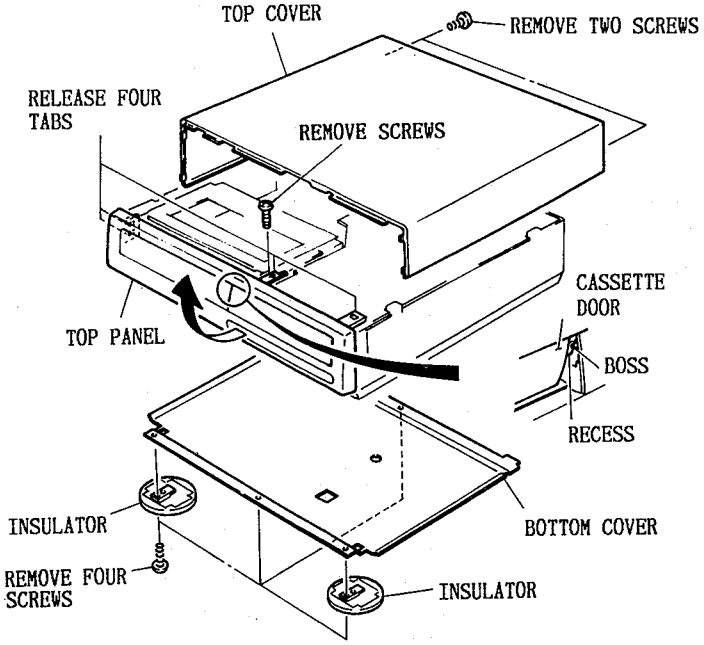


Fig. 3-1

4. Cassette Door

Note : Components to remove previously.
- Top and bottom cover
- Front panel

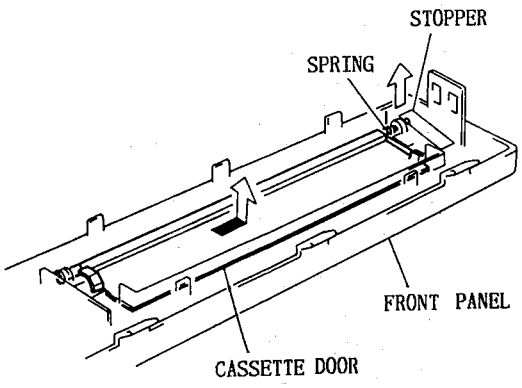


Fig. 3-2

5. Rear Panel

Note : Components to remove previously.
- Top and bottom covers
- Front panel
- Main circuit board

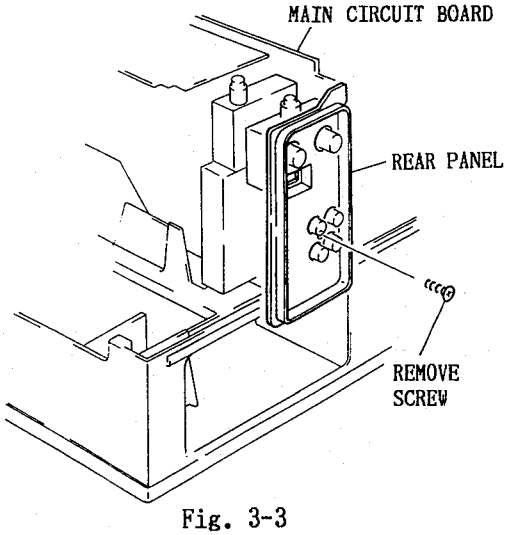


Fig. 3-3

4. CIRCUIT BOARD REMOVAL

Note : Remove the following components previously before removing the circuit boards.
- Top and bottom covers
- Front panel

1. Main Circuit Board

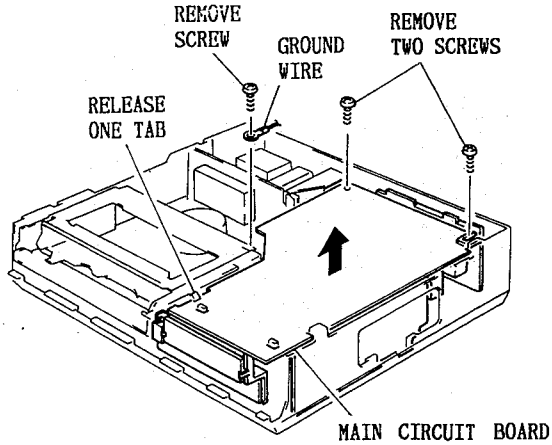


Fig. 4-1

2. Function SW Circuit Board

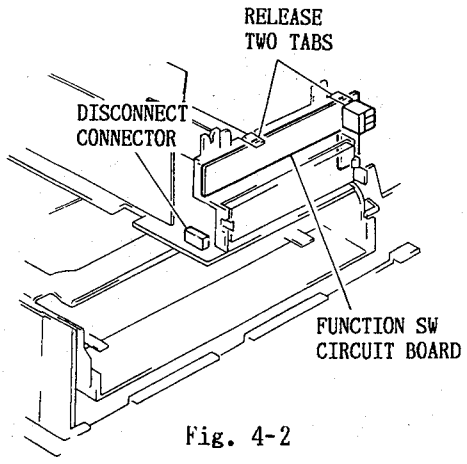


Fig. 4-2

3. Pre Amp Circuit Board

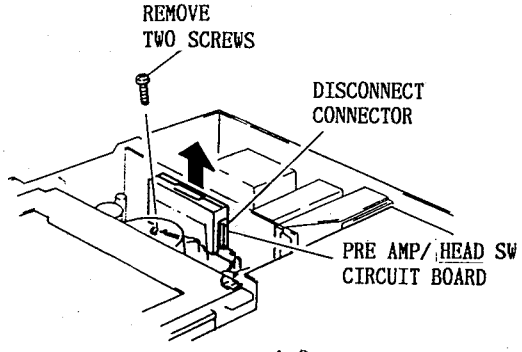


Fig. 4-3

4. Sensor Circuit Board

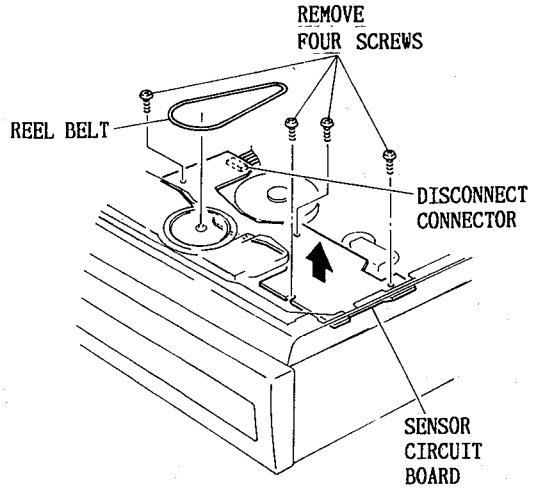


Fig. 4-4

5. CASSETTE LOADING MECHANISM REMOVAL

Note

☆ Components to remove previously.
- Top and bottom covers
- Front panel
- Capst B + Control circuit board

☆ Remove the parts of the cassette loading mechanism in the order listed.

1. Cassette Loading Mechanism Assembly and Cassette Door

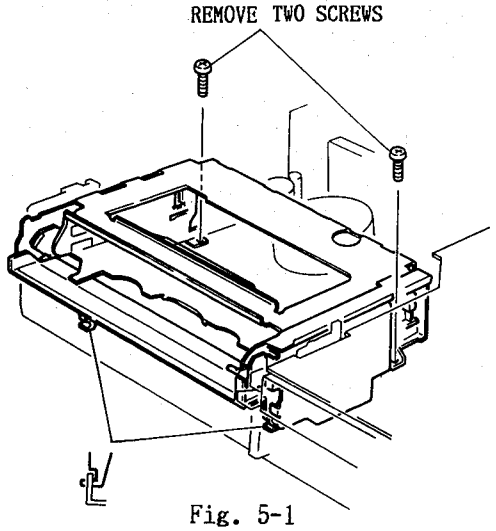


Fig. 5-1

2. Loading Gear Assembly, Chassis Holder, Cassette Holder Assembly, Front Holder

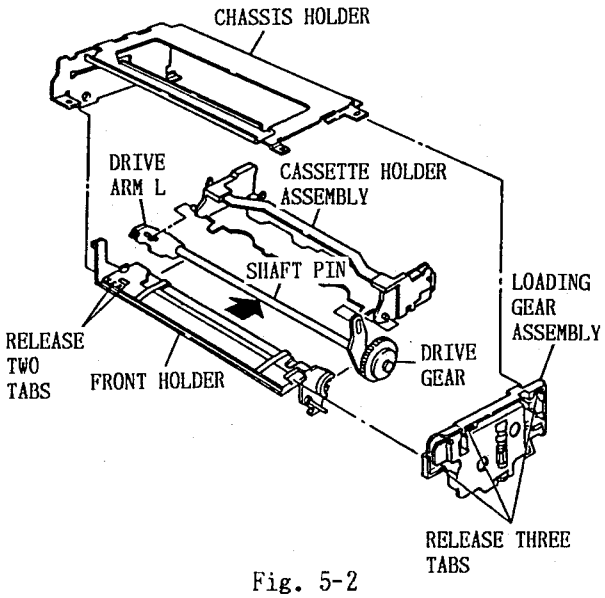


Fig. 5-2

3. Cassette Holder Base and Cassette Holder L,R

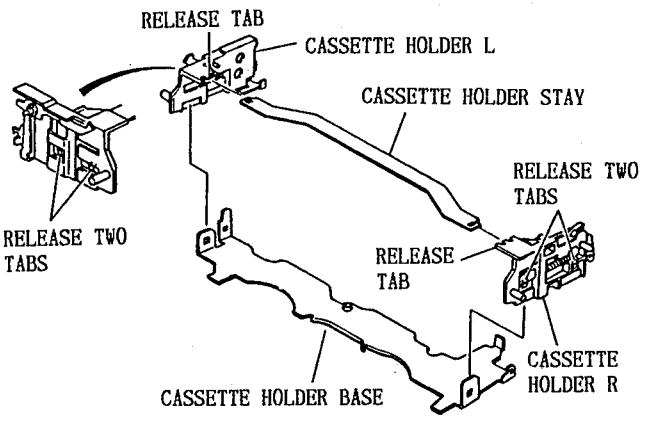


Fig. 5-3

4. Side Chassis, Door Arm, Worm Wheel, FL Worm Gear, Switch Lever A/B

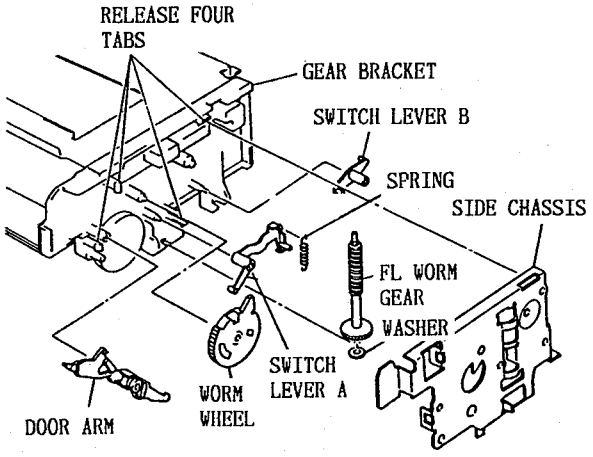


Fig. 5-4

5. Chassis Holder Reinstallation
6. Loading Gear Assembly Reinstallation

Notes

Assemble the Cassette Loading Mechanism by the reverse procedure to removal.
Care should be taken in the following areas:

☆ Check that the two bosses of the Cassette Holder are inserted into the groove in the left side of the chassis holder (Fig. 5-5).
☆ When reinstalling the loading gear assembly, check that the two bosses of the Cassette Holder are inserted into the grooves (Fig. 5-6).
☆ Align the mark on the Worm wheel Gear with the mark on the Drive Gear (Fig. 5-6)
☆ Check that the boss of the Cassette Switch Lever is set to the Cam section of the Drive Gear (Fig. 5-6).
☆ When reinstalling the Cassette Door, check that the boss of the door arm is inserted into the groove in the Cassette Door (Fig. 5-6).

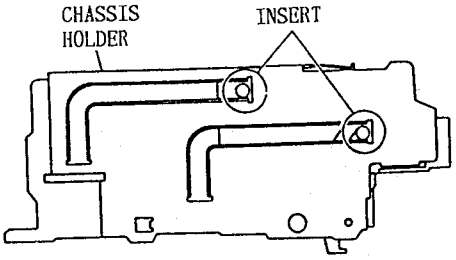


Fig. 5-5

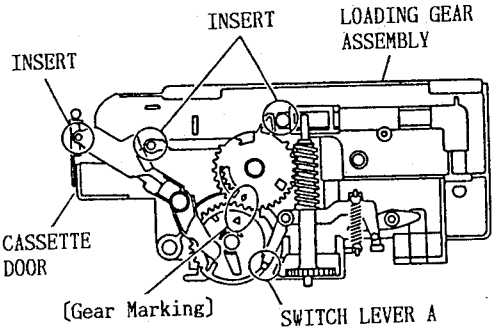


Fig. 5-6

6. MAIN MECHANICAL COMPONENTS REMOVAL

Note

☆ Components to remove previously.
- Top and bottom covers
- Front panel

1. Video Head (Upper Cylinder), Cylinder Motor Assembly

Note

☆ Use extreme care when removing the upper cylinder. Do not touch the video heads during servicing.

Caution when reinstalling

☆ Align the video heads connected to the blue connector of the upper cylinder with the arrow on the lower cylinder.

Adjustment after reinstalling

☆ Head Switching Point
☆ Adjustment after replaceing the cylinder

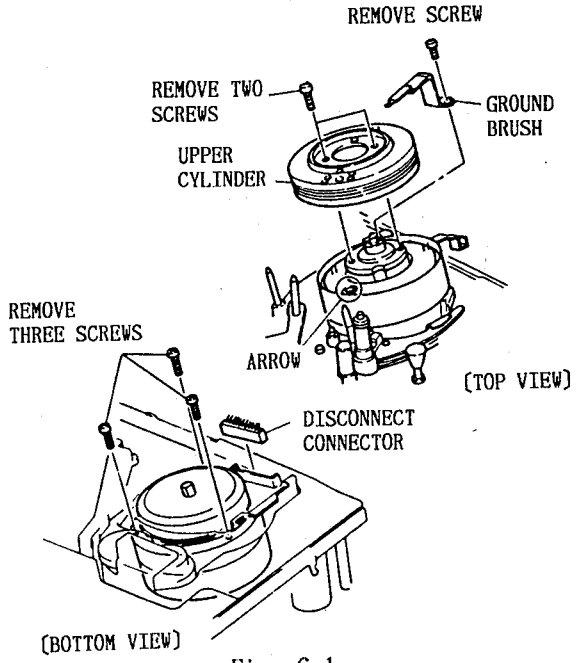


Fig. 6-1

2. FE (Full Erase) Head / Impedance Roller, A/C (Audio/Control) Head

Cautions when reinstalling the A/C Head

☆ Hook the spring between A/C head base and chassis.
☆ It should be 6.3mm between head base (1) and head base (2).

Adjustment after reinstalling the FE Head/ Impedance Roller

☆ Guide Poles Height

Adjustment after reinstalling the A/C Head

☆ A/C Head
☆ X Value
☆ Audio Bias Level

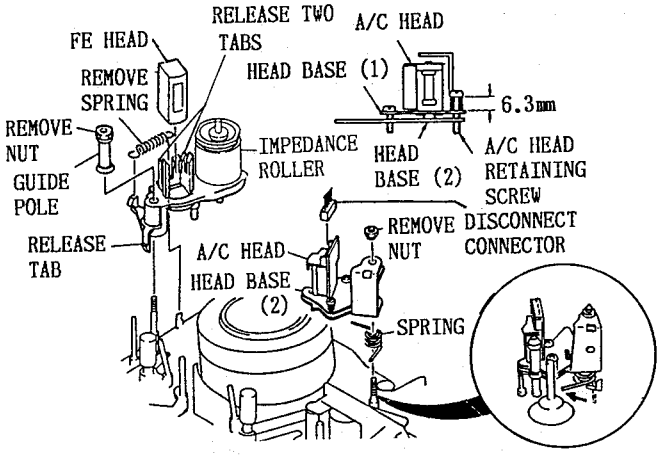


Fig. 6-2

3. Head Cleaning Arm Assembly, Head Cleaning Bracket Assembly

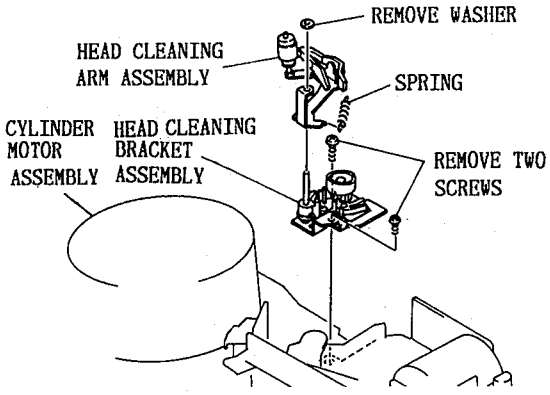


Fig. 6-3

4. Capstan Motor Assembly

Caution when reinstalling

Clean the capstan shaft.

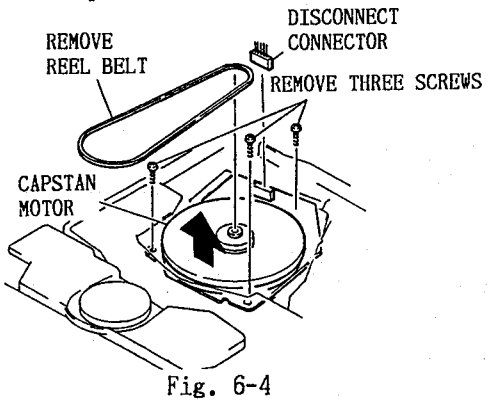


Fig. 6-4

5. Tension Arm/Tension Band

Adjustment after reinstalling

☆ Tension Arm Position

☆ Back Tension

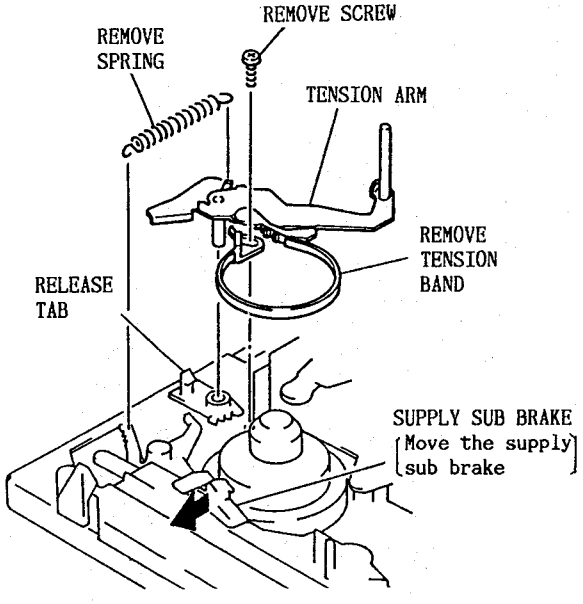


Fig. 6-5

6. Slider block Assembly, Reel Drive Idler

Caution when reinstalling

☆ Assemble both sub brakes while pushing them in the direction of arrow (A) and then pressing arrow mark (B).

☆ Check that the bosses of the load bracket are inserted into each slider.

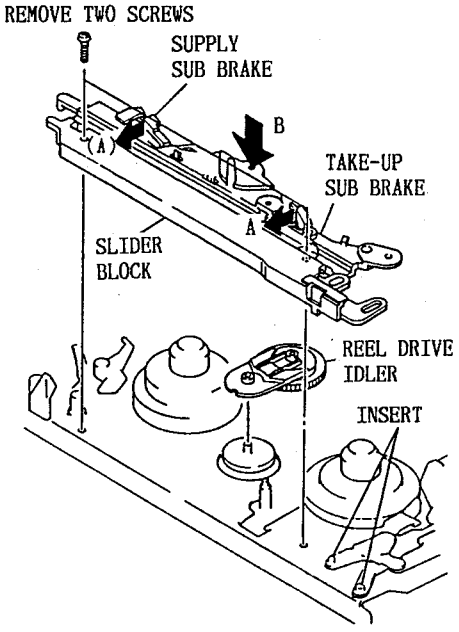


Fig. 6-6

7. Supply and Take-up Reel Disks

Adjustment after reinstalling

☆ Reel Disk Height

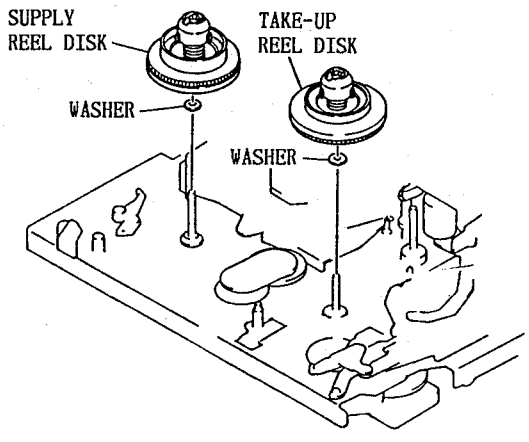


Fig. 6-7

8. Pressure Roller Assembly, Supply and Take-up Guide Poles, Supply and Take-up Guide Rollers

Adjustment after reinstallation

☆ Guide Pole Height

☆ Guide Roller Height

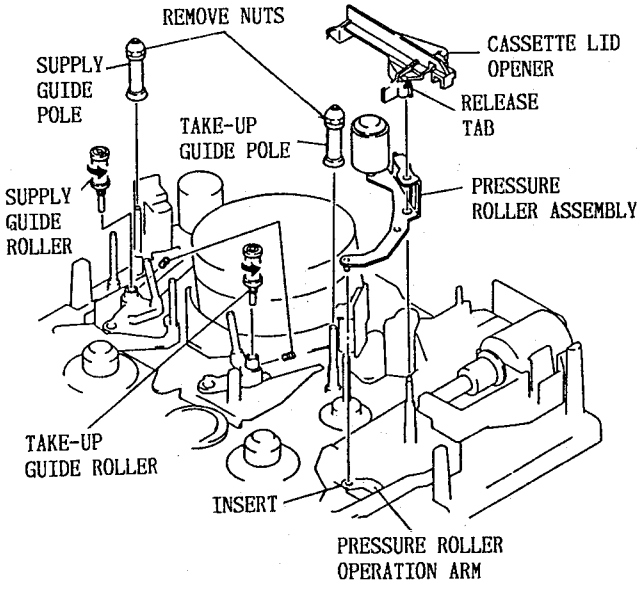


Fig. 6-8

9. Load Block Assembly, Brake Link Arm, FS Brake Arm

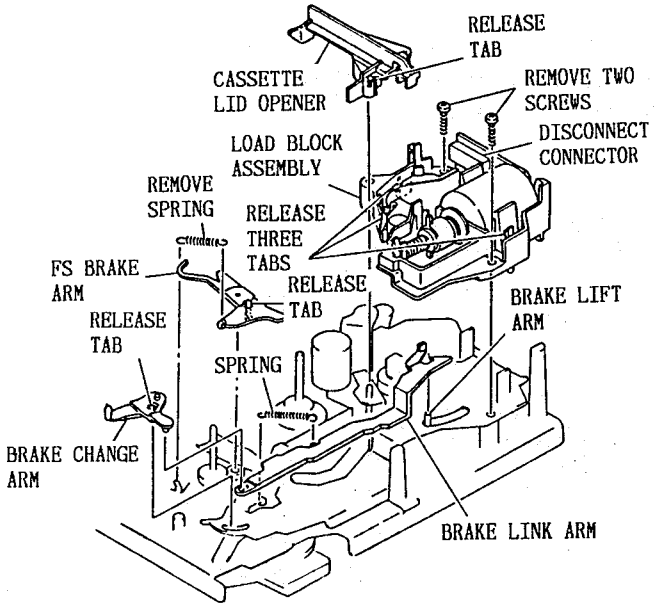


Fig. 6-9

10. Load Bracket Assembly

Caution when removing

1) Remove the screw and turn the worm wheel counterclockwise to move the lift arm in the direction of the arrow until the guide poles are in the loaded positions.

2) Pull the boss of the loading slide gear out of the holde in the lift arm and lift the load bracket assembly up to remove it.

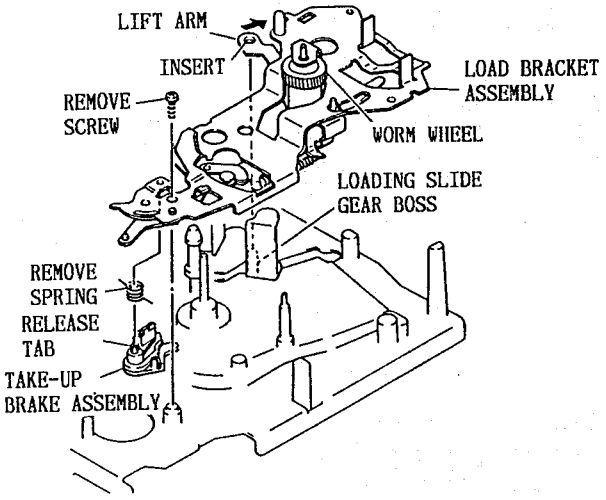


Fig. 6-10

Removal in item 11 and later is described as if the load bracket assembly has been removed.

11. Brake Operation Arm, Mode Gear, Worm Wheel, Pressure Roller Operation Arm, Mode Change Arm, Brake Lift Arm

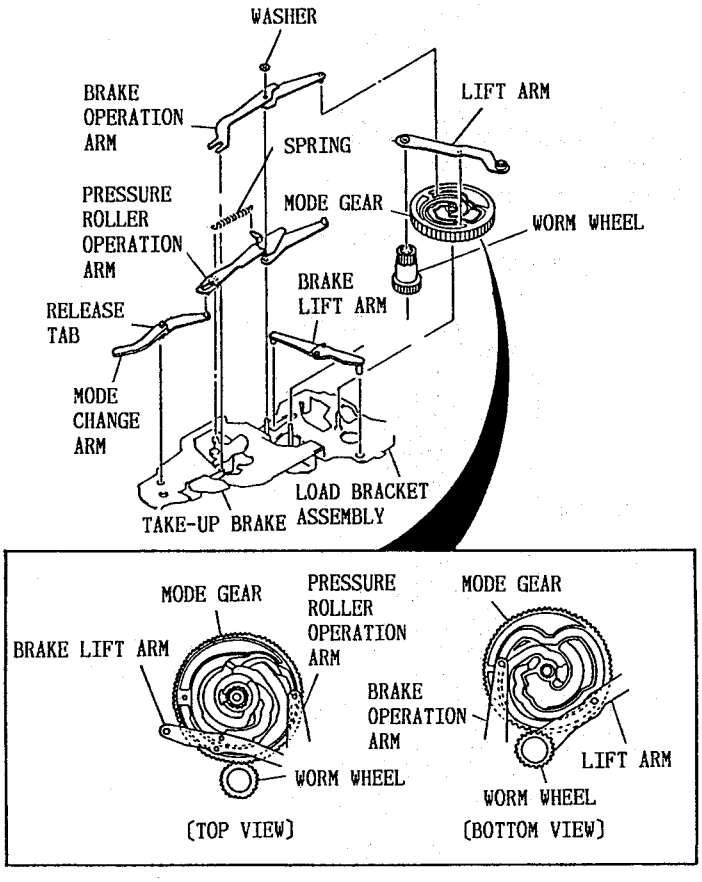


Fig. 6-11

12. Cylinder Motor Base, Supply and Take-up Loading Arms

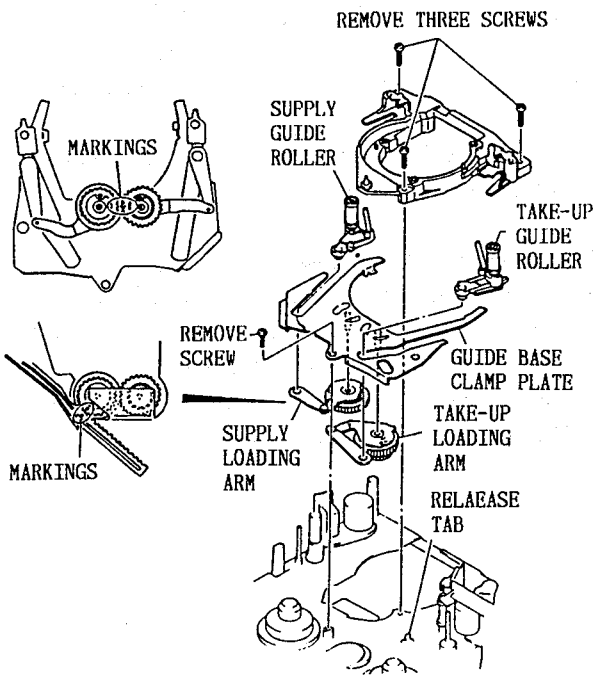


Fig. 6-12

13. Take-up Pulley and Clutch Base Assembly

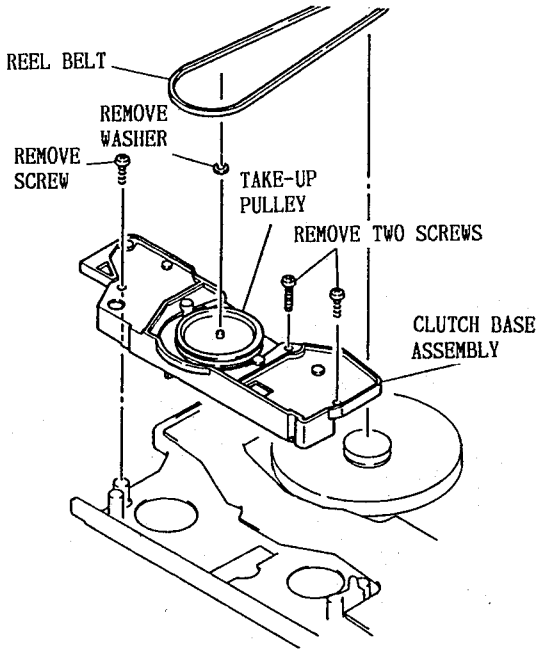


Fig. 6-13

13. Take-up Gear, Change Arm, Change Gear, Relay Gear, FL Change Gear and FL Change Lever

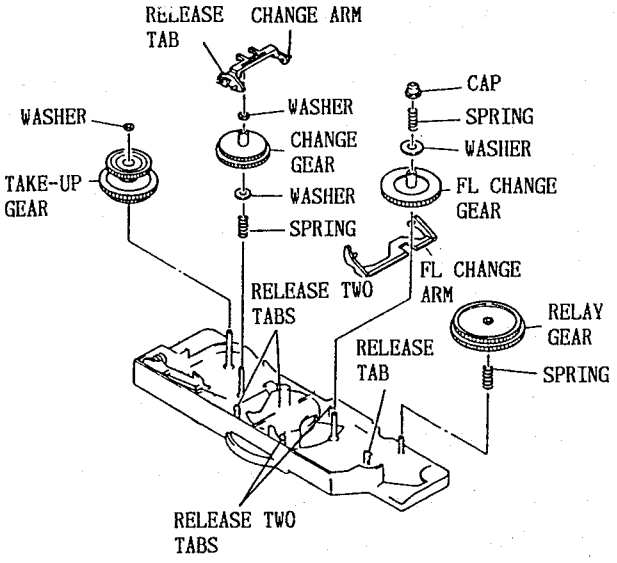


Fig. 6-14

7. ATTACHING THE ROTOR MAGNET PLATE TO THE CYLINDER MOTOR

Caution when installation

☆ The rotor magnet plate attached to the base of the cylinder motor (illustrated as the top in the figure below) is equipped with magnetic poles. If it is attached in reverse, the VTR will not operate normally. Attach it correctly following the procedure below.

How to attach

☆ There are holes in the rotor magnet plate and cylinder plate attaching bracket. Attach the rotor magnet plate so that hole (A) in the plate and hole (B) in the bracket across from the screw holes.

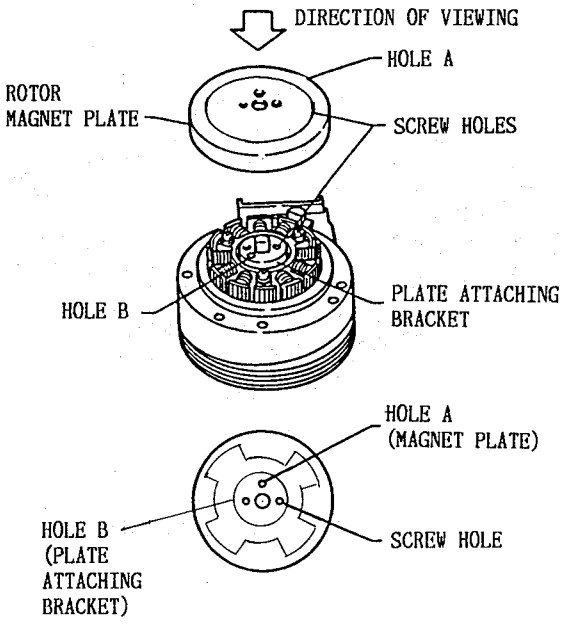


Fig. 7-1

ELECTRIC CIRCUIT ADJUSTMENTS

Test equipment and tapes necessary for adjustment

1) Dual-trace oscilloscope
2) Colour bar generator
3) VTVM
4) DC voltmeter
5) Frequency counter
6) Monitor TV
7) Alignment tape (MH-2)
8) Blank tape

Cautions on adjustments

1) If there are no special instructions, the following conditions apply:
   - Oscilloscope probe: 10:1
   - Oscilloscope synchronization: Auto-Sync
   - Tracking control: Electrical centre
2) When making more than one adjustment, make adjustments in the order listed.

To set tracking to the centre

When "Tracking control: Electrical centre position" is specified, centre the tracking as follows.

☆ Press the EJECT button to remove the cassette and re-insert it.

Resetting the microprocessors

All microprocessors installed in the unit will be reset once the AC power cord is removed from the AC outlet. However, the timer microprocessor is not reset for about 1 hour because it is backed up by the power backup circuit.

Servicing Position

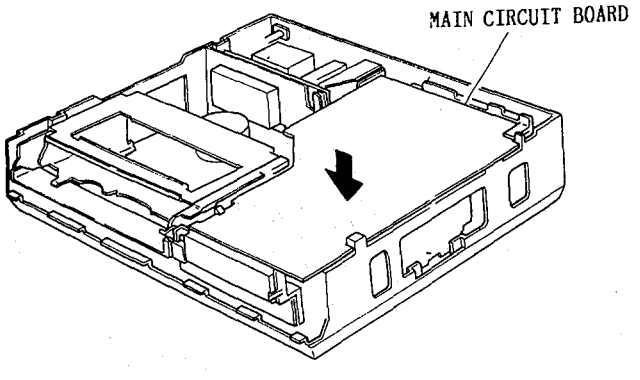


Fig. 1-1 Main Circuit Board

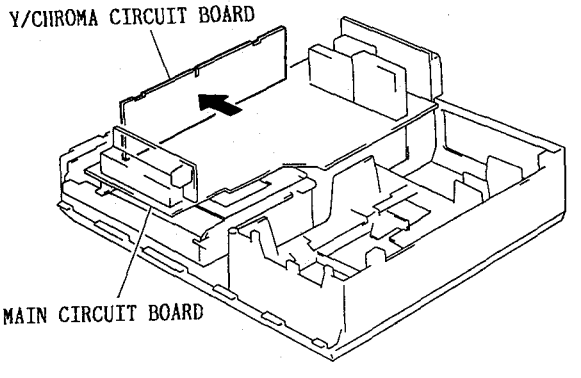


Fig. 1-2 Y/Chroma Circuit Board

ADJUSTMENT PARTS LOCATIONS

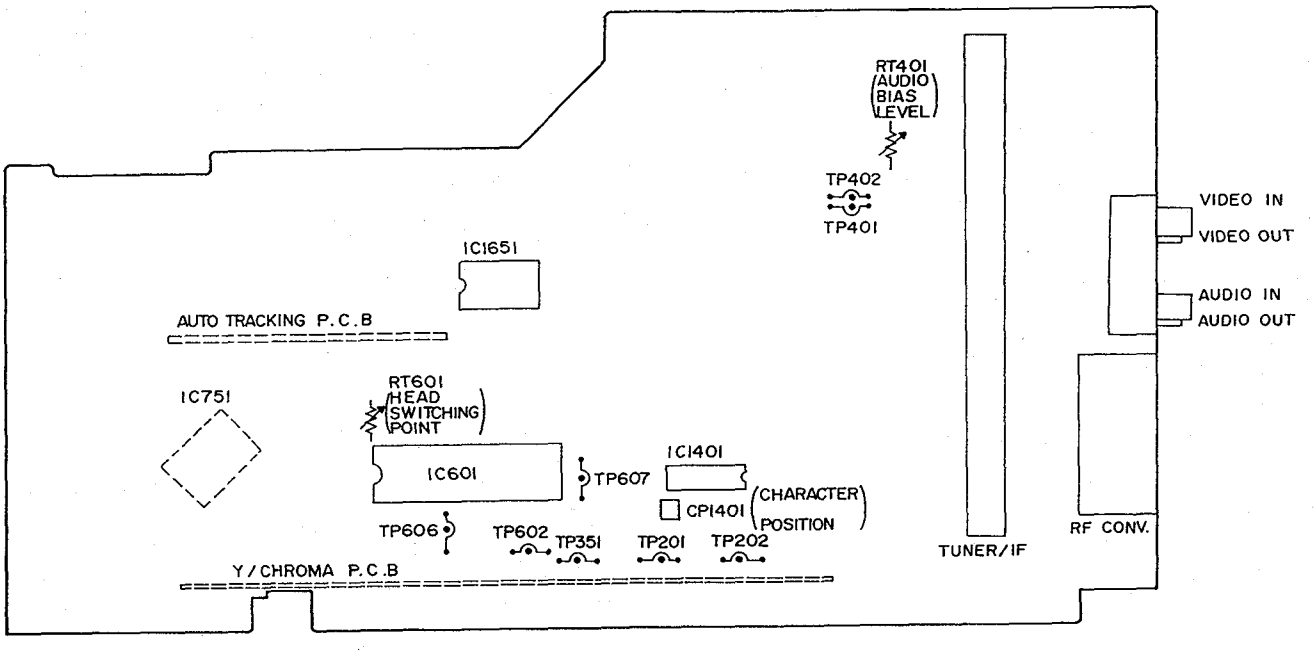


Fig. 1-3 Main Circuit Board (Solder Side)

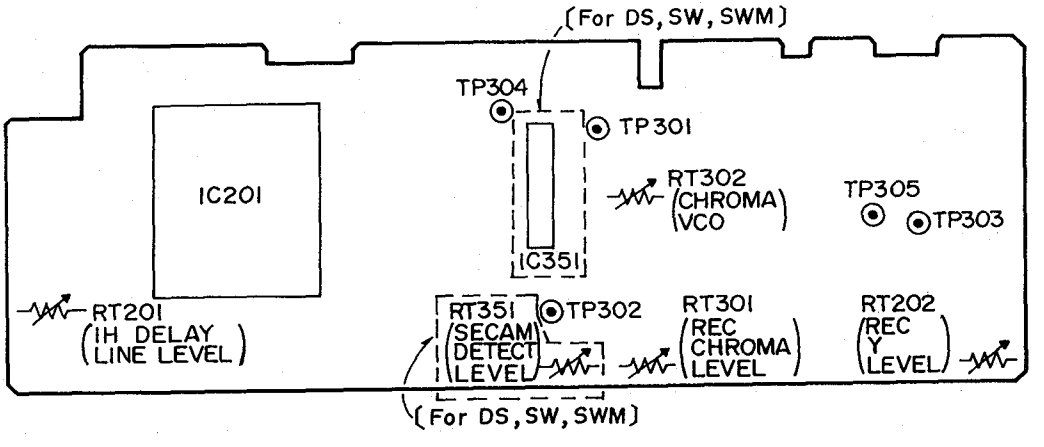


Fig. 1-4 Y/Chroma Circuit Board (Components Side)

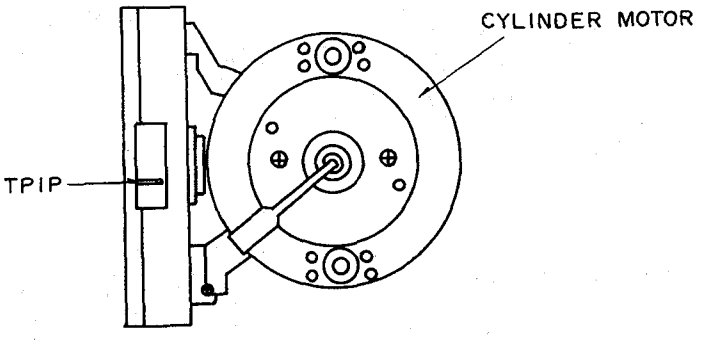


Fig. 1-5 Pre Amp Circuit Board (Top View)

1. SERVO CIRCUIT BOARD ADJUSTMENTS

1. Head Switching Point Adjustment

Purpose of adjustment and fault occurring if incomplete

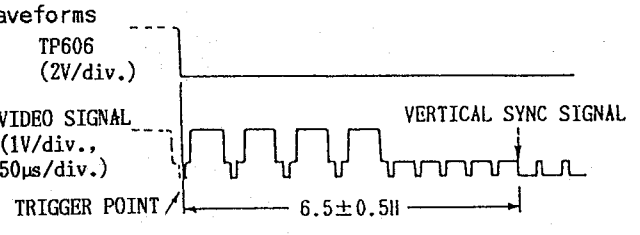
Purpose: Set the video head switching point to almost the centre where the CH-1 and CH-2 envelopes overlap each other during playback.

Fault: • The vertical sync signal is degraded and vertical jitter occurs.
• Switching noise occurs in lower part of picture

Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
• Oscilloscope	• CH-1: VIDEO OUT • CH-2: TP606 (SW25Hz)	• Playback alignment tape (Stairsteps Section) • Tracking control: Electrical Centre	• RT601
• Alignment tape (MH-2) (Parts No. 7099052)			

Adjustment Procedure
(Oscilloscope Settings)
• Set sync slope switch to "—"
• Trigger with CH-2
Vertical sync signal :
6.5H±0.5H from trailing edge (trigger point) of SW25Hz pulse.

Waveforms



2. Vert. Sync Adjustment

Purpose of adjustment and fault occurring if incomplete

Purpose: Change timing for adding vertical drive pulse and suppress vertical jitter in picture during trick play.

Fault: Vertical jitter occurrs during trick play.

Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
• Monitor TV	• RF OUT	• Record colour bar signal and play it back with this unit in STILL mode.	• TRACKING BUTTONS (▲/▼)
• Colour bar generator (or receive TV programme)	• VIDEO IN		
• Blank tape			

Adjustment Procedure
TRACKING BUTTONS : Suppress vertical jitter in picture.

2. Y/CHROMA CIRCUIT ADJUSTMENTS

1. Rec Y/CHROMA Level Adjustments

Purpose of adjustment and fault occurring if incomplete

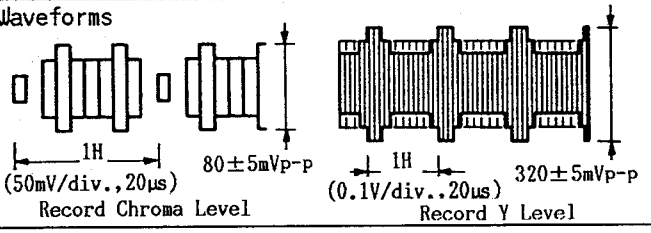
Purpose: Set the Y/C record levels to the optimum valuse.

Fault: • Diamond beats occur in the played back picture or colouring becomes poor.
• The played back picture becomes dark and noise increases, or the picture glares and becomes whitish.

Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment Points
• Oscilloscope	• TP1 (on PRE AMP) • GND (SHIELD COVER)	• REC mode	• RT301(REC CHROMA LEVEL) • RT202(REC Y LEVEL)
• Colour bar generator (or receive TV programme)	• VIDEO IN		
• Blank tape			

Adjustment Procedure
1) Turn the RT202 fully counterclockwise (copper side)
2) RT301:Set the record chroma level to 80±5mVp-p.
3) RT202:Set the record Y level to 320±5mVp-p.

Waveforms



2. 1H Delay Line Level Adjustment

Purpose of adjustment and fault occurring if incomplete

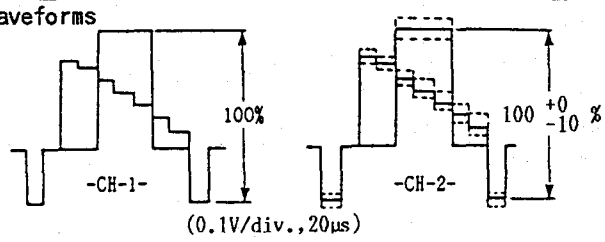
Purpose: To operate the vertical processor normally.

Fault: • Random noise may be comspicuous.
• Dropout may not be compensated.

Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
• Oscilloscope	• CH-1: TP202(VIDEO) • CH-2: TP201(CCD VIDEO)	• Playback alignment tape (Colour bars section)	• RT201
• Alignment tape(MH-2) (Parts No.7099052)			

Adjustment Procedure
(Oscilloscope setting)
• Trigger with CH-2
RT201:Set the amplitude of CH-2 waveform to 100 $^{+0}_{-10}$ % of that of CH-1 waveform.

Waveforms



3. Secam Detect. Level Adjustments (For DS, SW, SWM)

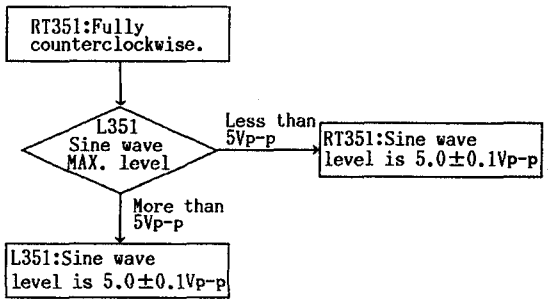
Purpose of adjustment and fault occurring if incomplete

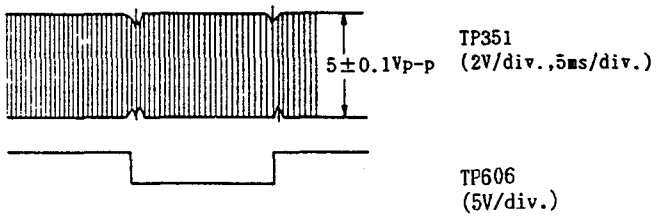
Purpose: Set the Secam detect level to the specified value.

Fault: During automatic discrimination PAL and SECAM are discriminated incorrectly.

Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment Points
• Oscilloscope	• CH-1: TP351 • CH-2: TP606 (SW25Hz)	• REC mode	• RT351 • L351
• SECAM colour bar generator (Full colour bar)	• VIDEO IN		
• Blank tape			

Adjustment Procedure
(Oscilloscope Settings)
• Trigger with CH-2





4. Chroma VCO Adjustment

Purpose of adjustment and fault occurring if incomplete

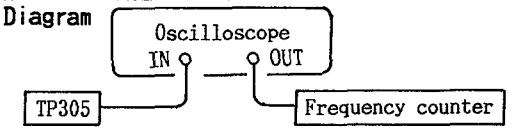
Purpose: Fine tune the 627kHz VCO oscillation frequency.

Fault: Colour becomes poor during playback.

Test Equipment/Jig	Test Equipment Connection Point	VTR State	Adjustment Point
• Oscilloscope	• TP305	• LINE mode (Non-signal)	• RT302
• Frequency counter	• Oscilloscope output		

Adjustment Procedure
1) Connect a jumper between TP301 and TP303.
2) Connect the jumper between TP301 and TP606.
3) RT302: The frequency counter reads 627kHz±5kHz.

Connection Diagram



3. AUDIO CIRCUIT ADJUSTMENT

1. Audio Bias Level Adjustment

Purpose of adjustment and fault occurring if incomplete

Purpose: Set audio bias during recording to optimum level.

Fault: • Bias too high: High-frequency response deteriorates.
• Bias too Low: Sound tends to be distorted.

Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
• VTVM	• TP401(BIAS) • TP402(BIAS GND)	• Non-signal recording	• RT401
• Blank tape			

Adjustment Procedure

RT401: The VTVM reads 2.5mVrms±0.1mVrms.

4. ON SCREEN DISPLAY CIRCUIT ADJUSTMENT

1. Character Position Adjustment

Purpose of adjustment and fault occurring if incomplete

Purpose: To set the positions of characters displayed on the screen.

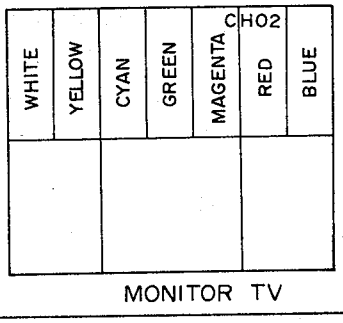
Fault: The character display position is drifted.

Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
• Colour bar generator	• VIDEO IN jack	• Receive colour bar signal (LINE IN) • OSD mode	• CP1401
• Monitor TV	• Check with monitor TV		

Adjustment Procedure

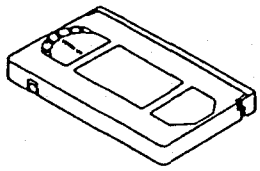
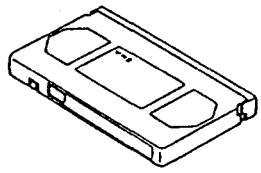
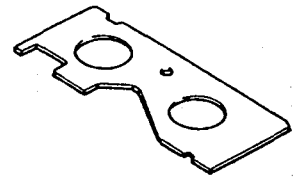
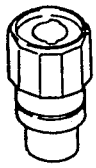
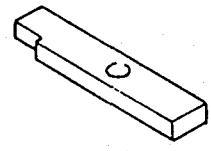
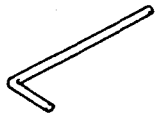
1) Operate the remote control to display the channel number.
2) CP1401: Set the end of letter "H" of the channel display to the border between magenta and red.

Adjustment Diagram

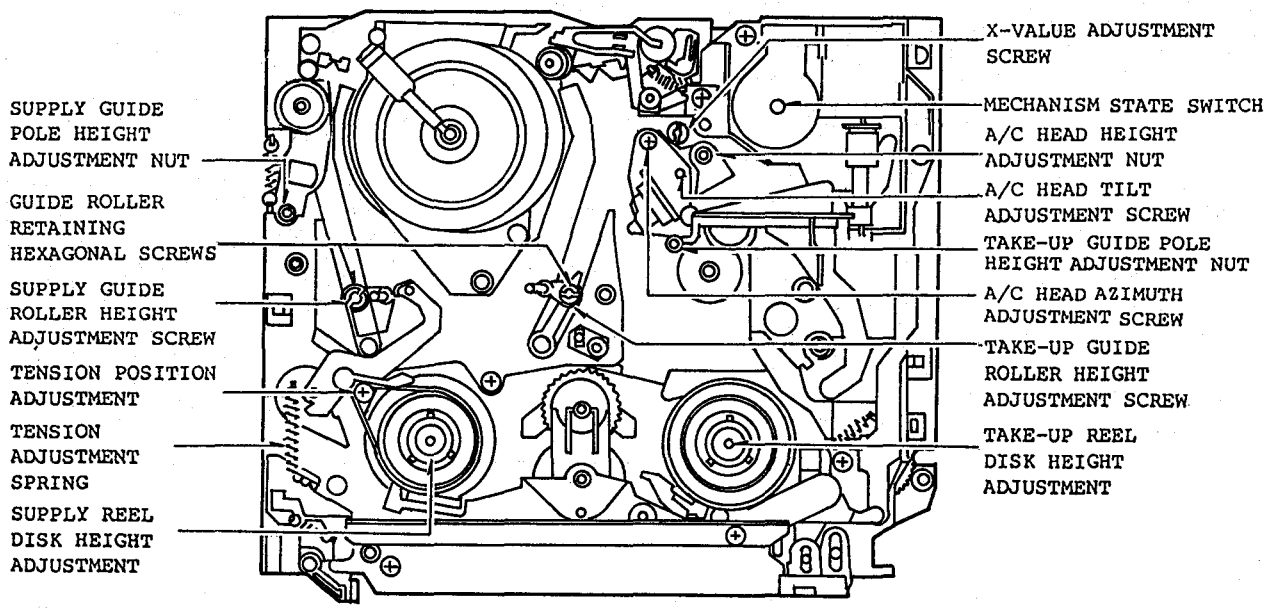


MECHANISM ADJUSTMENT

JIGS AND TAPES FOR ADJUSTMENT

1. Back Tension Meter Parts No.7099004 	2. Alignment Tape - MH-2 - Parts No. 7099052 	3. Master Plane Parts No.7099279 
4. Torque Gauge Parts No.7099039 	5. Torque Gauge Adaptor Parts No.7099035 	6. Reel Disk Height Jig Parts No.7099038 
7. 1.5mm Hexagonal Wrench 0.9mm Hexagonal Wrench 		

ADJUSTMENT PARTS LOCATIONS



Top View of Mechanism

MECHANICAL PARTS ADJUSTMENT

1. Mechanism State Switch

Purpose: To detect the mechanism state correctly and prevent malfunctions.

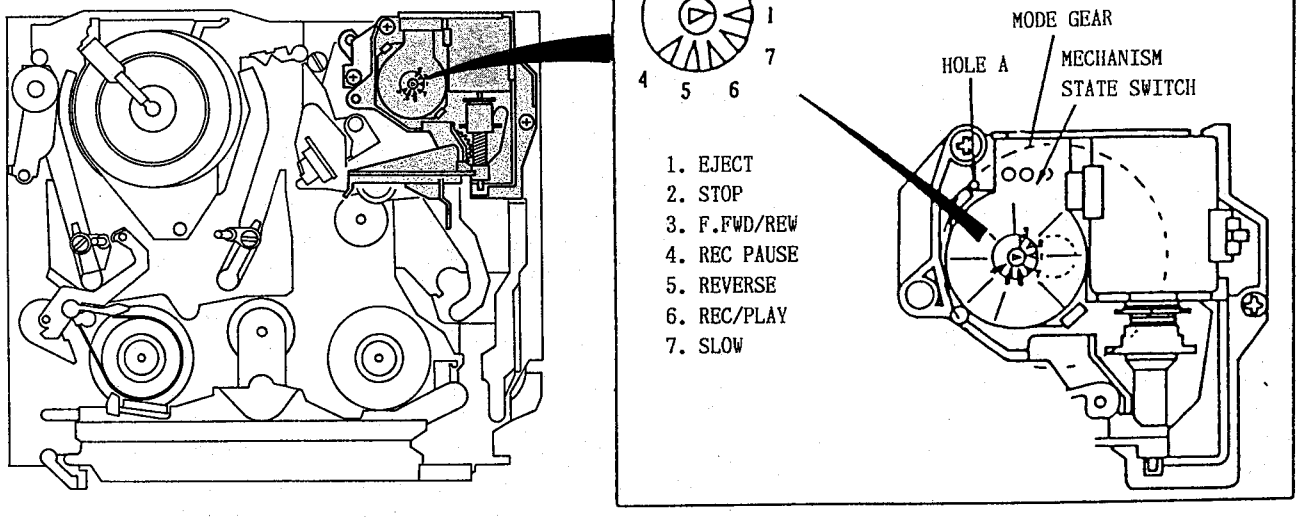
Test equipment/jig	Preparation for adjustment	State of VTR	Adjustment points
• Blank tape	———	• Eject mode (with the cassette ejected)	• Mechanism state switch • Mode gear

Adjustment procedure

1) Check that the arrow on the centre shaft of the mechanism state switch points to the arrow of mechanism mode indication number 1. Also check that hole (A) beside the mechanism state switch and the hole in the mode gear are aligned.

2) If the above alignments are not obtained, adjust as follows.
   1. Remove the mechanism state switch/loading motor assembly.
      (See "MAIN MECHANICAL COMPONENTS REMOVAL" in CHAPTER 2.)
   2. Move the mode gear to align the position of hole (A).
   3. Turn the gear on the back of the mechanism state switch so that the arrow on the centre shaft of the switch points to the arrow of mechanism mode indication number 1.
   4. Reinstall the mechanism state switch/loading motor assembly in the above condition.

3) Load a blank tape and perform various operations to check that loading and unloading are performed correctly.



TAPE TRANSPORT SYSTEM PARTS ADJUSTMENT

The tape transport system is the path from the supply reel disk passing through the video heads to the take-up reel disk. The transport system parts, especially the parts which directly come into contact with a tape, should be kept clean without scratches, dust, oil, etc.

The tape transport system has been adjusted before the unit is shipped from the factory. Therefore, when parts in the transport system are replaced, the transport system is stabilized by only adjusting the new parts correctly.

1. Reel Disk Height Adjustment

Purpose: To set the reels of the cassette to the specified height, thus determining the height of tape.

Test equipment/jigs	Preparation for adjustment	State of VTR	Adjustment points
• Master plane (Parts No.7099279) • Reel disk height jig (Parts No.7099038)	1) Remove the cassette loading mechanism. 2) Mount the master plane and place the reel disk height jig on it.	——	• Spacers in the supply and take-up reel disks

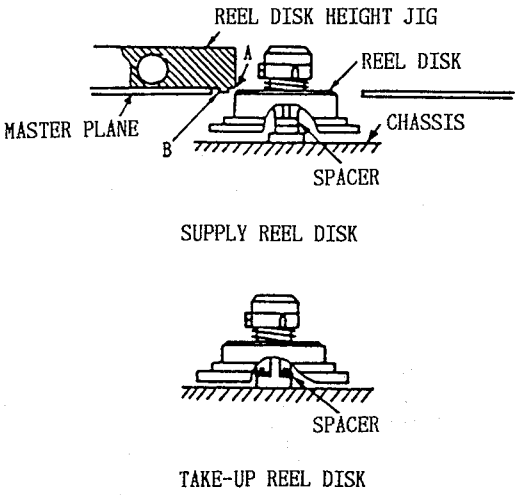
Adjustment procedure

1) Check that the reel disk is between sections A and B of the reel disk height jig.
2) If the disk is not between sections A and B of the jig, replace the spacer (0.5mm thick) in the reel disk or adjust them.

[Caution]

When the tension arm and tension band are removed, adjust the tension pole position and tension after reinstalling them.

Adjustment diagram



2. Tension Pole Position and Tension Adjustment

Purpose: To make the tension of tape constant so that the contact between the video heads and tape is stabilized.

Test equipment/jigs	Preparation for adjustment	State of VTR	Adjustment points
Position adjustment ———	———	1) Remove the top cover. 2) Set the VTR to the loading state without inserting a cassette. (See page 4-11)	Position adjustment: Tension band holder
Tension adjustment • Back Tension Meter (Parts No.7099004)	———	Tension adjustment 3) Play the tension cassette.	Tension adjustment: Tension spring hooking position

Adjustment procedure

- Position Adjustment -

1) Loosen the tension band retaining screw.
2) Insert the tension band holder into one of grooves 1 to 3 and set the gap between the tension pole and chassis to -0.5 to 2mm.
3) Tighten the tension band retaining screw.
4) After adjustment is completed, perform loading without inserting a cassette and recheck the tension pole position.

- Tension Adjustment -

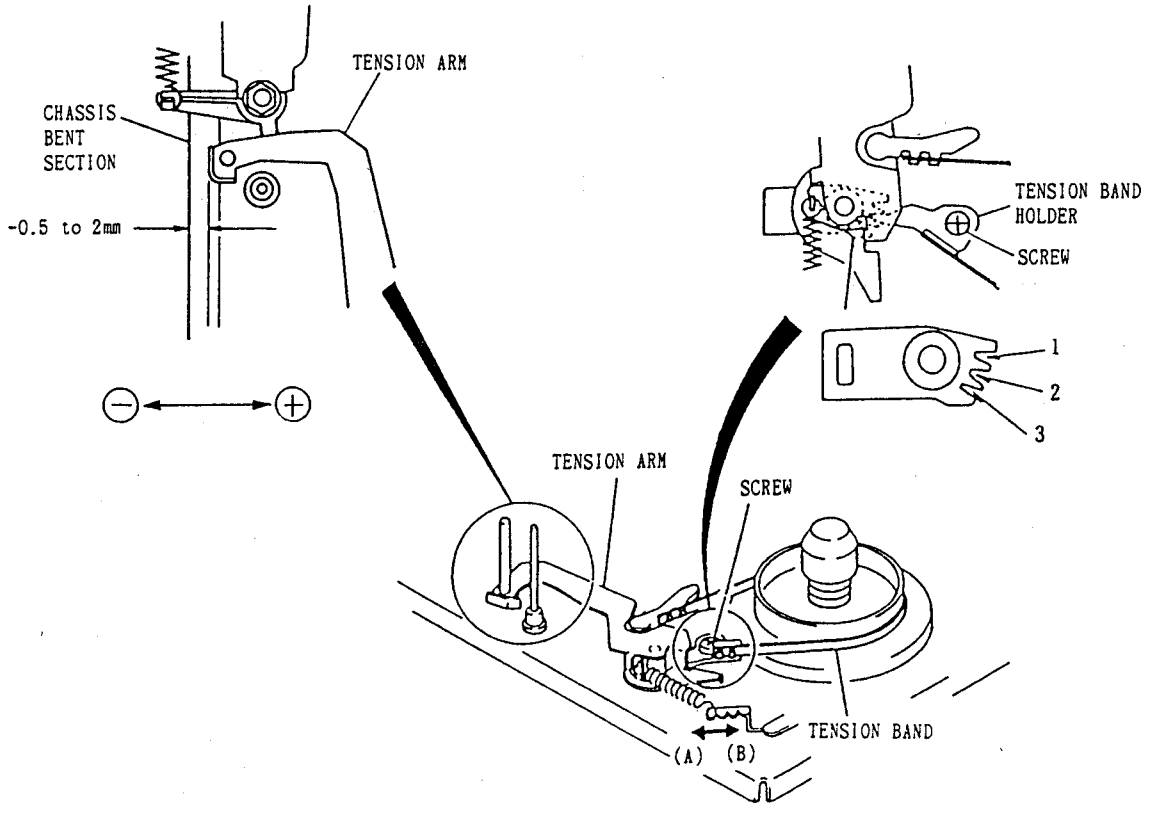
Reading of Back Tension Meter: 34 to 44 g-cm (reference value)

If the reading is higher than the reference, move the spring in direction (A)

If the reading is lower than the reference, move the spring in direction (B).

Caution: When the tension position was changed greatly (more than 6 g-cm), recheck the tension pole position. If it is drifted, readjust the tension pole position and tension.

Adjustment diagram



3. Guide Pole Height Adjustment

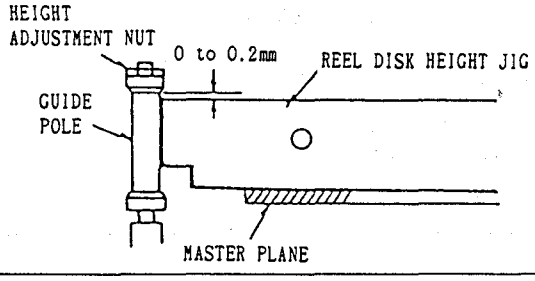
Purpose: To regulate the tape height.

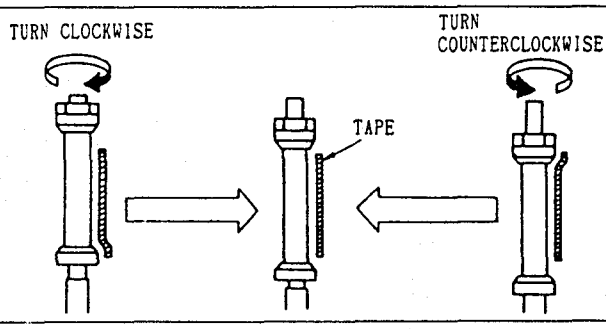
Test equipment/jigs	Preparation for adjustment	State of VTR	Adjustment points
• Master plane (Parts No.7099279) • Reel disk height jig (Parts No.7099038)	1) Remove the cassette loading mechanism. 2) Mount the master plane and place the reel disk height jig on it.	——	• Nuts on the supply and take-up guide poles
• Blank tape	——	• Playback mode	

Adjustment procedure

1) Set the clearance between the bottom of the guide pole's upper flange and top of the reel disk height jig is 0 to 0.2mm.
2) Load a blank tape to run it and check that the tape does not ride over the upper and lower flanges of the guide pole.
3) If the tape rides over either flange, adjust the height of guide pole as follows.
   If the tape rides over the upper flange, turn the nut counterclockwise.
   If the tape rides over the lower flange, turn the nut clockwise.

Adjustment diagram





4. Guide Roller Height Adjustment

Purpose: To regulate the height of tape so that the bottom of tape runs along the tape guide line on the cylinder.

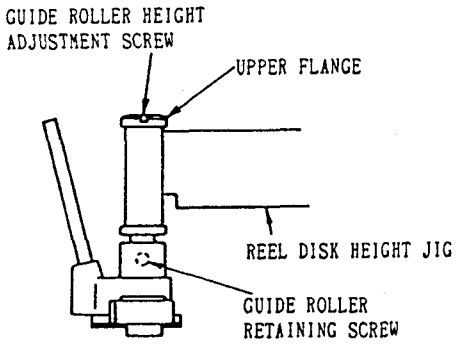
Coarse Adjustment

Test equipment/jigs	Preparation for adjustment	State of VTR	Adjustment points
• Master plane (Parts No.7099279) • Reel disk height jig (Parts No.7099038) • 0.9mm Hexagonal wrench	1) Remove the cassette loading mechanism. 2) Mount the master plane and place the reel disk height jig on it.	——	Height adjustment screws on the supply and take-up guide rollers

Adjustment procedure

1) Loosen the guide roller retaining screw (so that the guide roller does not turn during loading, unloading and play).
2) Align the bottom of the guide roller's upper flange and the top of the reel disk height jig.
3) Perform the precise adjustment continuously.

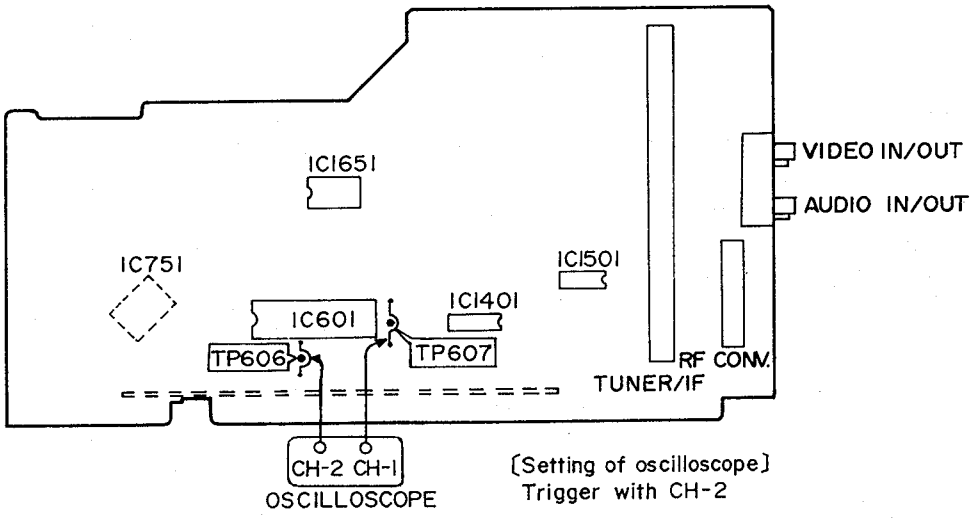
Adjustment diagram



Precise Adjustment

Test equipment/jigs	Test equipment connection points	State of VTR	Adjustment points
• Oscilloscope	• CH-1: TP607 (PB FM) • CH-2: TP606 (SW25Hz)	• Play alignment tape. (Colour bars)	• Guide roller height adjustment screws
• Alignment tape (MH-2) (Parts No.7099052) • 0.9mm Hexagonal wrench	——		

Connection diagram

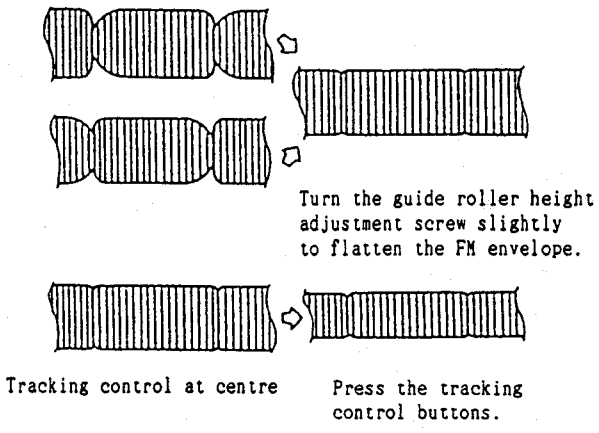


Adjustment procedure

Note: To set tracking to the electrical centre
- Press the EJECT button to remove the alignment tape and re-insert it.

1) Tracking control (playback) : Electrical centre position
(when this adjustment is performed after the cylinder has been replaced, set the tracking control so that the FM output is maximum.)
2) Height adjustment screw: Flatten the FM envelope.
3) Press the tracking control up and down buttons.
4) Check that the FM drops at the start and end of FM envelope are uniform.
5) Tighten the guide roller retaining screw.

Waveforms



5. Audio / Control (A/C) Head Adjustment

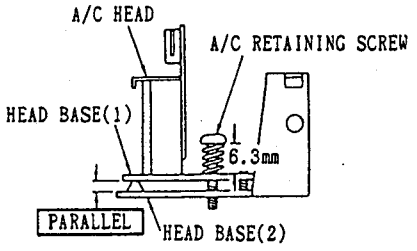
Purpose: To keep the contact between the tape and head even so the specified track is recorded and played back.

Coarse Adjustment

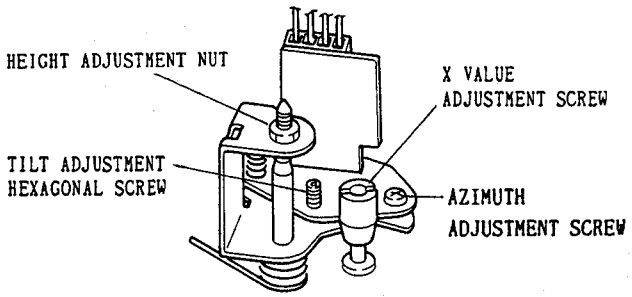
Test equipment/jigs	Preparation for adjustment	State of VTR	Adjustment points
• Master plane (Parts No.7099279) • Reel disk height jig (Parts No.7099038) • 1.5mm Hexagonal wrench	1) Remove the cassette loading mechanism. 2) Mount the master plane and place the reel disk height jig on it.	———	• A/C head retaining screw • Azimuth adjustment screw • Height adjustment nut • Tilt adjustment screw
• Blank tape	———	• Run the blank tape.	

Adjustment procedure/adjustment diagrams

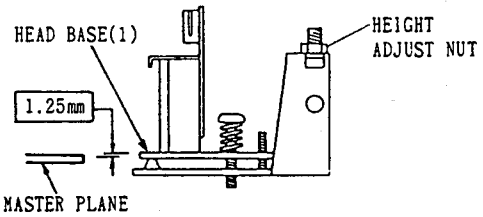
1) A/C head retaining screw: Check that the spring section of the A/C head retaining screw protrudes 6.3mm over the top of head base (1).



2) Tilt adjustment hexagonal screw, azimuth adjustment screw: Make head bases (1) and (2) parallel.

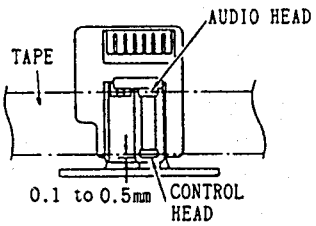


3) Height adjustment nut: Set the clearance between the master plane and head base (1) to approx. 1.25mm.



4) Remove the adjustment jigs, load a blank tape and set the VTR to the play mode.

5) Check that there is no conspicuous curling and riding over around the A/C head. If there is conspicuous curling or riding over, readjust the tilt adjustment hexagonal screw, azimuth adjustment screw and height adjustment nut. When the bottom edge of tape is 0.1 to 0.15mm from the bottom edge of the control head's core, the height of A/C head is ideal.



6) Perform the precise adjustment continuosly.

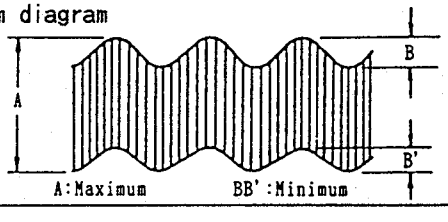
Precise Adjustment

Test equipment/jigs	Test equipment connection point	State of VTR	Adjustment points
• Oscilloscope	• AUDIO OUT jack	• Play alignment tape (Stairsteps)	• Azimuth adjustment screw • Height adjustment nut • Tilt adjustment screw
• Alignment tape (MH-2) (Parts No.7099052) • 1.5mm Hexagonal wrench	———		

Adjustment procedure

1) Adjust the azimuth adjustment screw, height adjustment nut and tilt adjustment hexagonal screw slightly and alternately: Make the audio output maximum and flat (minimum fluctuations).

Waveform diagram



5. Audio / Control (A/C) Head Adjustment

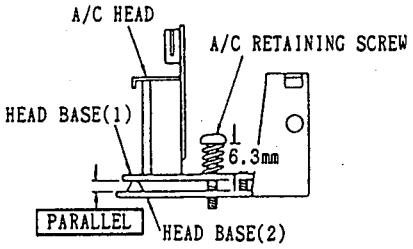
Purpose: To keep the contact between the tape and head even so the specified track is recorded and played back.

Coarse Adjustment

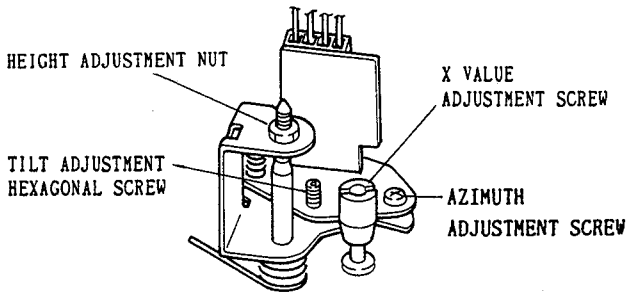
Test equipment/jigs	Preparation for adjustment	State of VTR	Adjustment points
• Master plane (Parts No.7099279) • Reel disk height jig (Parts No.7099038) • 1.5mm Hexagonal wrench	1) Remove the cassette loading mechanism. 2) Mount the master plane and place the reel disk height jig on it.	———	• A/C head retaining screw • Azimuth adjustment screw • Height adjustment nut • Tilt adjustment screw
• Blank tape	———	• Run the blank tape.	

Adjustment procedure/adjustment diagrams

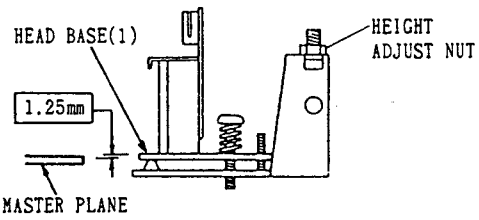
1) A/C head retaining screw: Check that the spring section of the A/C head retaining screw protrudes 6.3mm over the top of head base (1).



2) Tilt adjustment hexagonal screw, azimuth adjustment screw: Make head bases (1) and (2) parallel.

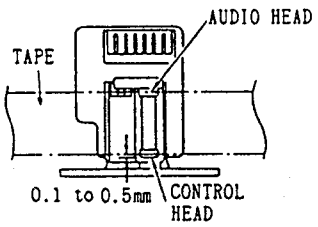


3) Height adjustment nut: Set the clearance between the master plane and head base (1) to approx. 1.25mm.



4) Remove the adjustment jigs, load a blank tape and set the VTR to the play mode.

5) Check that there is no conspicuous curling and riding over around the A/C head. If there is conspicuous curling or riding over, readjust the tilt adjustment hexagonal screw, azimuth adjustment screw and height adjustment nut. When the bottom edge of tape is 0.1 to 0.15mm from the bottom edge of the control head's core, the height of A/C head is ideal.



6) Perform the precise adjustment continuosly.

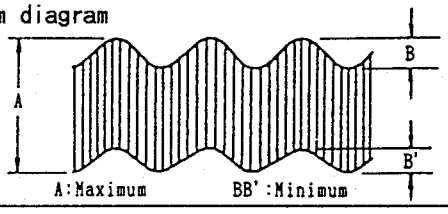
Precise Adjustment

Test equipment/jigs	Test equipment connection point	State of VTR	Adjustment points
• Oscilloscope	• AUDIO OUT jack	• Play alignment tape (Stairsteps)	• Azimuth adjustment screw • Height adjustment nut • Tilt adjustment screw
• Alignment tape (MH-2) (Parts No.7099052) • 1.5mm Hexagonal wrench	———		

Adjustment procedure

1) Adjust the azimuth adjustment screw, height adjustment nut and tilt adjustment hexagonal screw slightly and alternately: Make the audio output maximum and flat (minimum fluctuations).

Waveform diagram



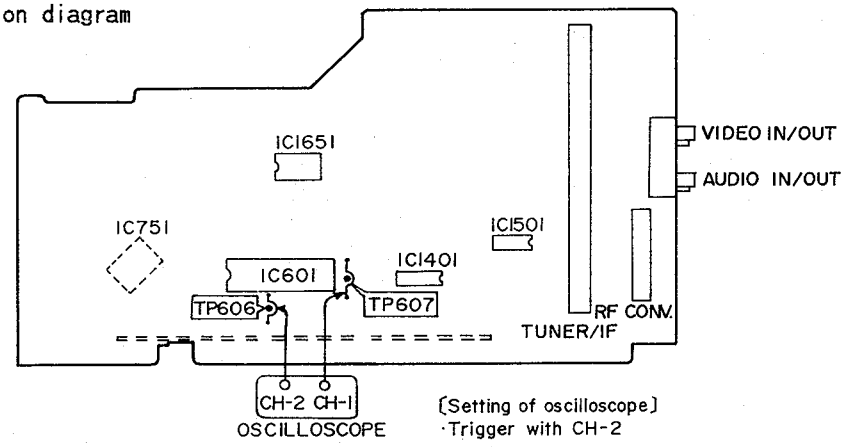
6. X Value Adjustment

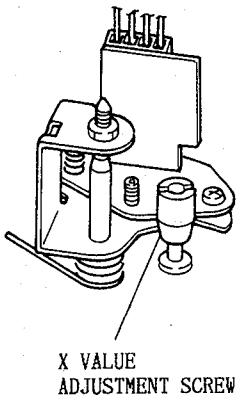
Purpose: To obtain compatibility with other VTRs.

Note: Always perform the tracking preset adjustment (page 3-3) that should be done when the cylinder is replaced before adjusting the X value.

Test equipment/jigs	Test equipment connection points	State of VTR	Adjustment point
• Oscilloscope	• CH-1: TP607 (PB FM) • CH-2: TP606 (SW25Hz)	• Play alignment tape (Stairsteps)	• X value adjustment screw
• Alignment tape (MH-2) (Parts No.7099052) • 1.5mm Hexagonal wrench	——		

Connection diagram

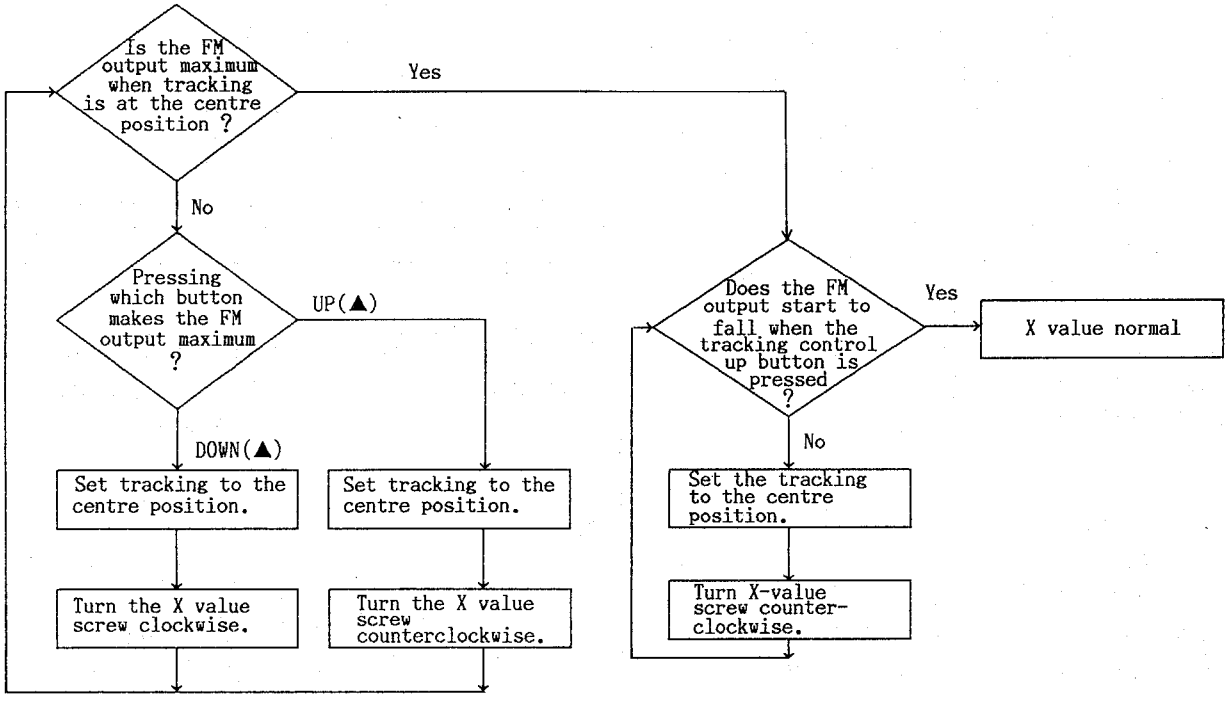




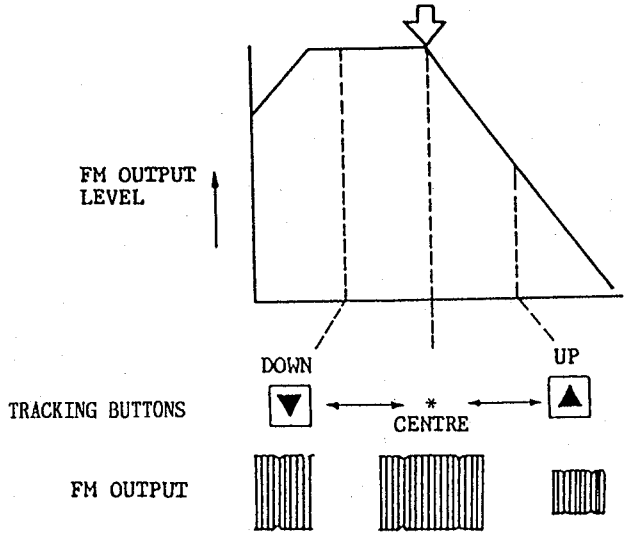
Adjustment procedure

Adjust so that the FM output is maximum when tracking is set to the centre and it starts to fall when the tracking up button is pressed.

Note: To set tracking to the centre
- Press the EJECT button to remove the alignment tape and re-insert it.



Adjustment diagram

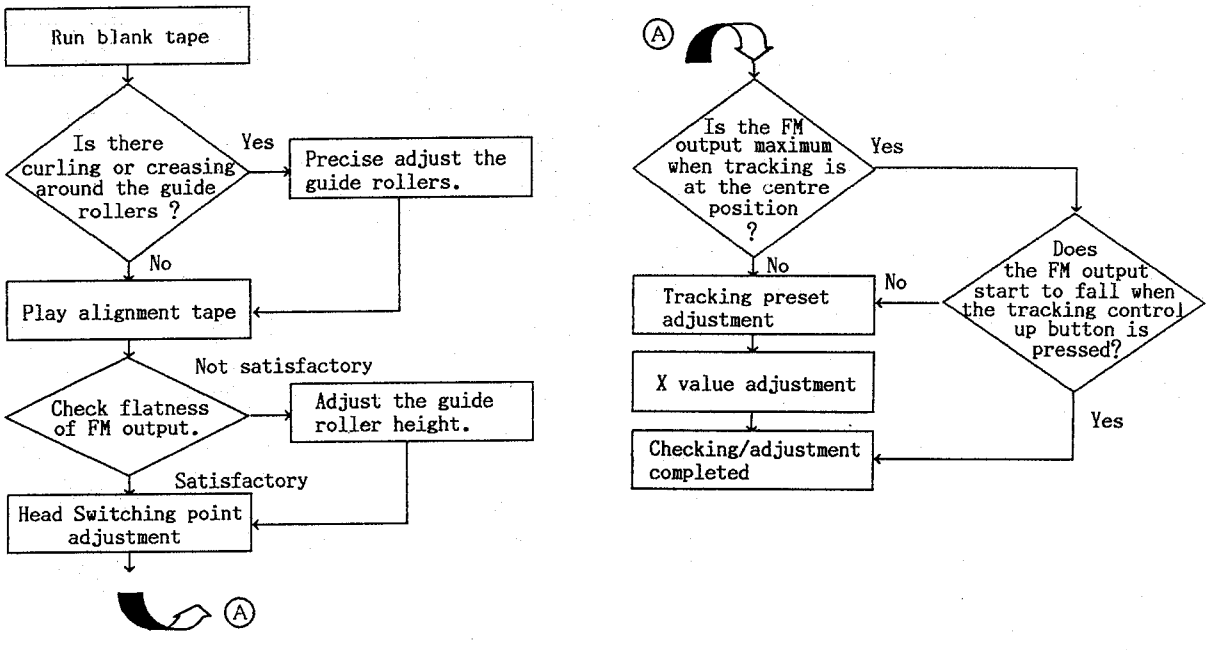


7. Adjustments After Replacing Cylinder (Video Heads)

Purpose: To suppress drift in the height relative to the guide roller and to minimize the X value after replacing the cylinder.

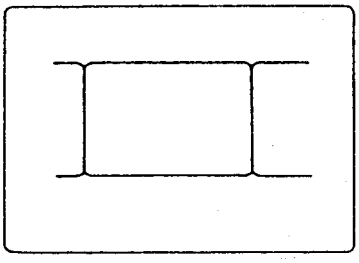
Test equipment/jigs	Test equipment connection points	State of VTR	Adjustment points
• Oscilloscope	Checking the flatness • CH-1: TP607 (PB FM) • CH-2: TP606 (SW25Hz)	• Run the blank tape	• Guide rollers (precise adjustment on page 4-6) • Head switching point (page 3-3) • X value (page 4-8)
• Alignment tape (MH-2) (Parts No.7099052) • Blank tape • 0.9mm/1.5mm Hexagonal wrenches • X value adjustment screwdriver	—	• Play alignment tape (Stairsteps)	

Checking/adjustment procedure

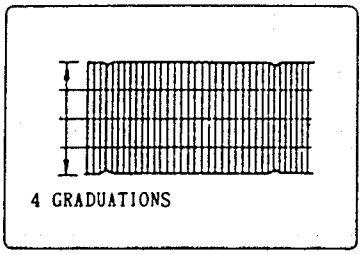


Checking procedure of the flatness and fluctuations of FM output and waveform diagrams

1) Use the tracking control to maximize the FM output.

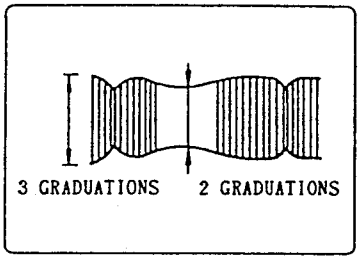


2) Fine tune the voltage level range of the oscilloscope to set the FM output to 4 graduations.



3) Press the tracking control buttons to set the maximum amplitude of the FM output 3 graduations.

4) Check that the mimimum amplitude is more than 2 graduations.



5) Check that the level fluctuations between the maximum and minimum amplitudes are less than 13%.

8. Tension/Torque Checks

Purpose: It is necessary to check the tension, torque and compression force at the tape take-up section and moving section to make the tape running smooth and satisfy the basic performance of the VTR. Check these if the tape running is not smooth or the tape speed is abnormal.

Test equipment/jigs	State of VTR
• Torque gauge • Torque gauge adaptor	• Set the VTR to each operation mode without inserting a cassette. (See page 4-11)

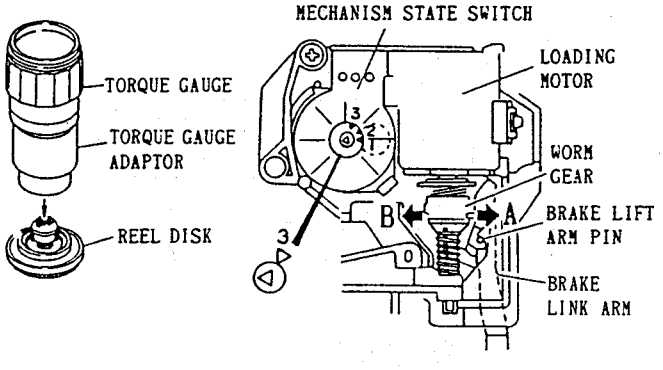
Item	VTR operation mode	Measured reel	Measured value
Main brake torque	Stop (Note)	Supply & take-up reels	170 g·cm or more
Slack removal torque	Unloading	Supply reel	90 ~ 230 g·cm
Fast forward torque	Fast forward	Take-up reel	400 g·cm or more
Rewind torque	Rewind	Supply reel	400 g·cm or more
Take-up torque	Play	Take-up reel	80 ~ 170 g·cm
Back-tension torque	Fast forward	Supply reel	4 ~ 25 g·cm
	Rewind	Take-up reel	

Checking method

The values are measured using a torque gauge and a torque gauge adaptor with the torque gauge fixed.

Note: Turn the worm gear in the direction of arrow (A) in the stop mode and shift the pointer on the mechanism state switch to "3" so as to apply the main brake to the supply reel disk. Then turn the worm gear in the direction of arrow (B) so that brake link arm is released from the brake lift arm pin.(Set the reel drive idler to the centre position.)

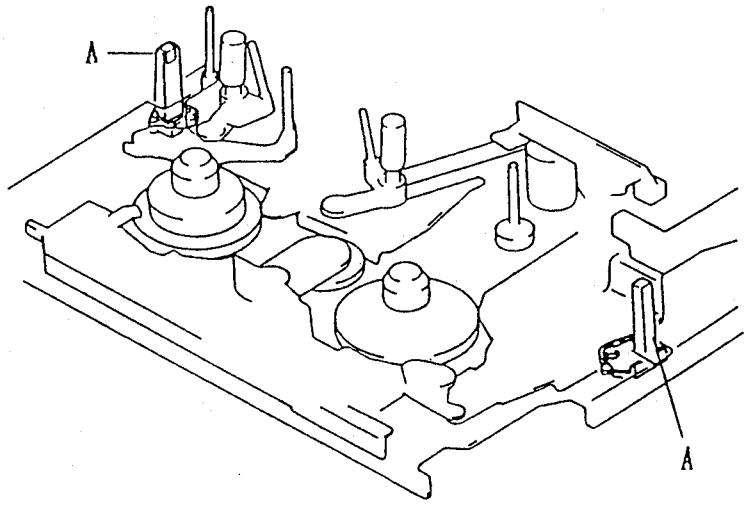
Adjustment diagram



9. To Set the VTR to the Loading State without Inserting a Cassette

1) Remove the top cover and front panel. 2) Remove the cassette loading mechanism. 3) Unplug the power lead form the AC outlet. 4) Cover the supply and take-up end sensors (sections A in the figure below) with black masking tape, etc. to shut off the light. 5) Plug the mains lead into the AC outlet. 6) Turn the VTR on. The VTR can accept the inputs of each mode in this state. However, the rewind operation cannot be performed for more than a few seconds because the take-up reel disk in the stop state and reel pulses cannot be detected.	(Cautions) Always return the VTR to the original state in the following order after the above operations have been performed. 1) Remove the masking tape, etc. from the supply and take-up end sensor. 2) Unplug the mains lead from the AC outlet to reset the system control microprocessor.

Adjustment diagram



5. Maintenance Procedures

5-1 Cleaning

(1) Cleaning video head

First use a cleaning tape. If dirt on head is too stubborn to remove by tape, use the cleaning kit. Moisten the cleaning stick with cleaning fluid at the point indicated. Touch the stick to the head tip and gently turn the head (rotating cylinder) to the right and left.
(Do not move the stick vertically and make sure that only the chamois leather on the stick comes into contact with the head. Otherwise, the head may be damaged.)
Thoroughly dry the head. Then test run a tape. If cleaning fluid remains on the video head, the tape may be damaged when it comes into contact with the head surface.

(2) Cleaning the tape transport system and drive system, etc.

Wipe with gauze moistened with alcohol or freon.

Notes:
1) The tape transport system is the system which comes into contact with the running tape. The drive system consists of those parts which run the tape.
2) Make sure that during cleaning you do not touch the tape transport system with the tip of a screwdriver and that no force is applied to the system that could deform it.

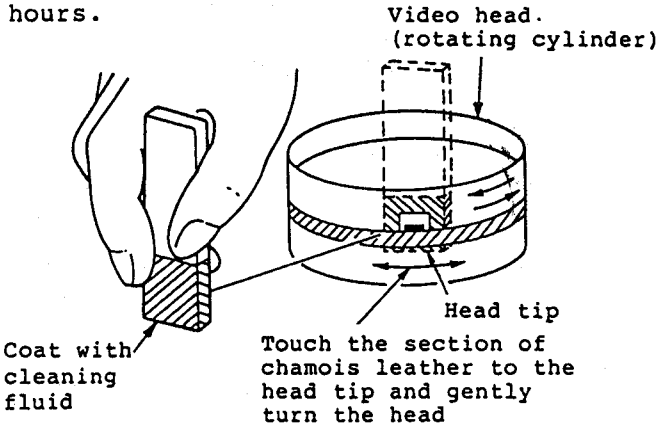
5-2 Lubrication

(1) Guidelines for lubricating with oil

Use the oiler to apply one or two drop of pan motor oil or Sonic Slidas oil. Make sure not to use too much oil because it may spill over or leak out coming into contact with rotating parts and causing slippage or other problems. If too much oil is applied, wipe clean with alcohol or freon.

(2) Periodic oil lubrication

Oil specified locations every 1,000 hours.



5-3 Greasing

(1) Greasing guidelines

Apply grease, Hitazol or Froil, with a stick or brush. Do not use excess grease. It may come into contact with the tape transport or drive system. Wipe any excess and clean with gauze moistened with alcohol or freon.

(2) Periodic greasing

Grease specified locations every 5,000 hours.

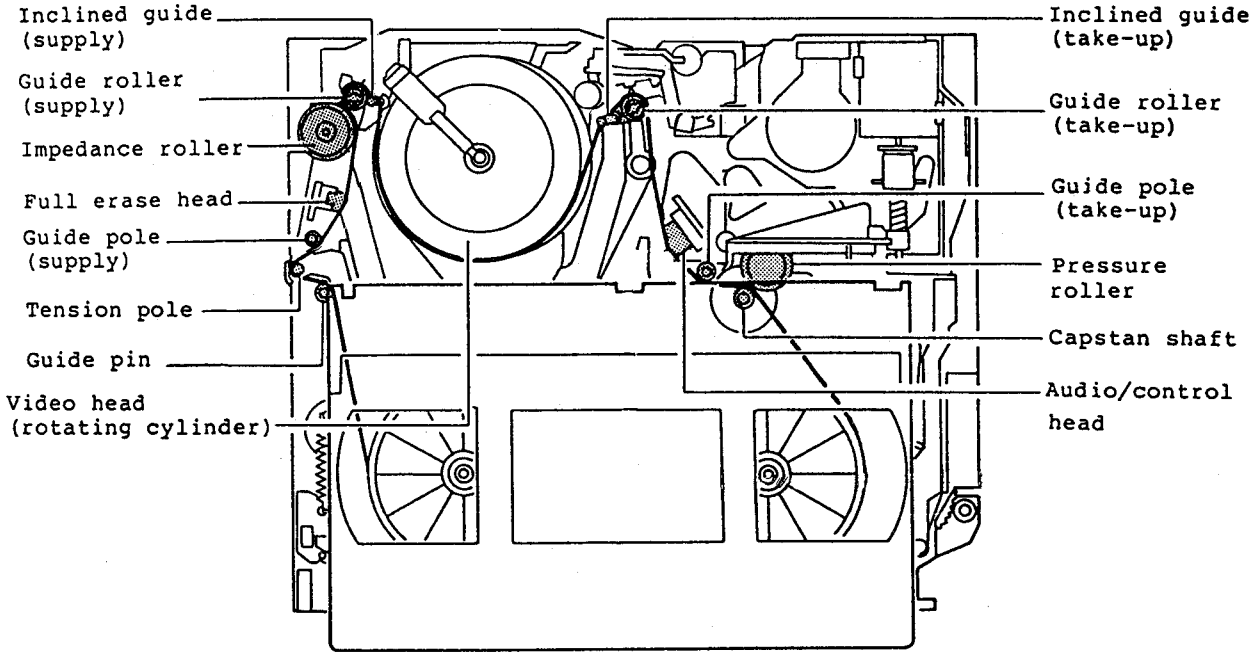


Fig. 1 Tape Transport System

6. Inspection Locations

Phenomenon	Inspection Location	Replacement
Colour beats	① Dirt on full erase head	
Poor S/N, no colour	② Dirt on video heads	○
Vertical jitter	③ Dirt on video heads	
	③ Dirt in tape transport system	
Low volume, sound disordered	④ Dirt on audio/control head	○
Tape does not run. Tape is slack.	⑤ Dirt on pressure roller	○

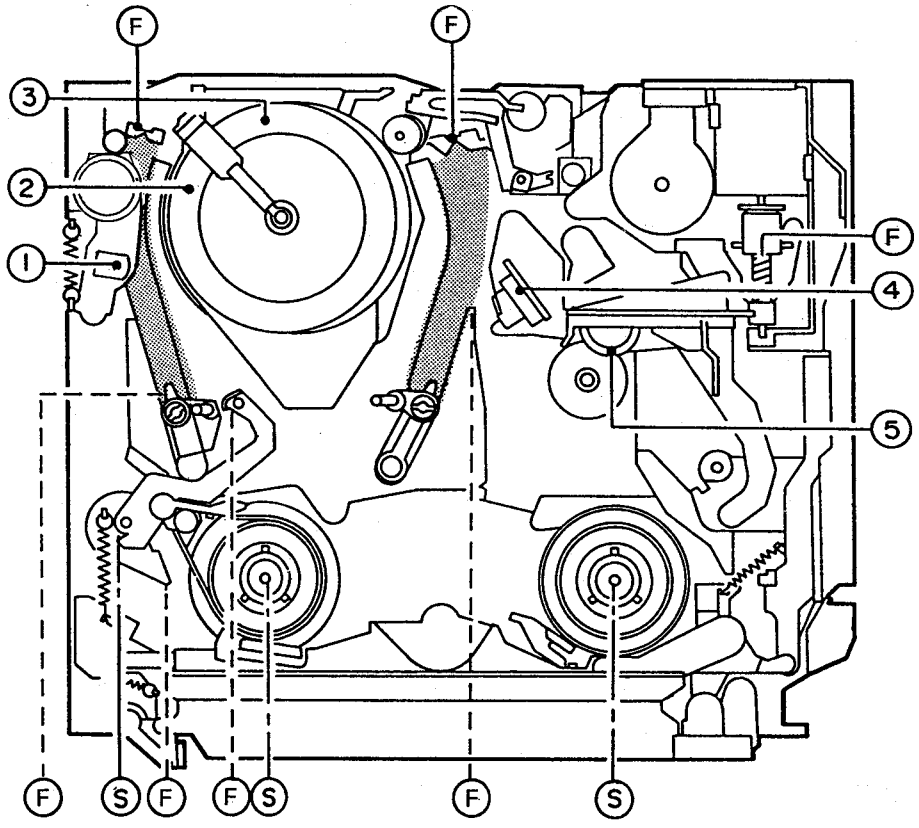


Fig. 2 Top View of Mechanism

Phenomenon	Inspection Location	Replacement
Does not fast forward or rewind, or rotation is slow	Dirt on reel belt	○
Tape does not run		
Slack tape		

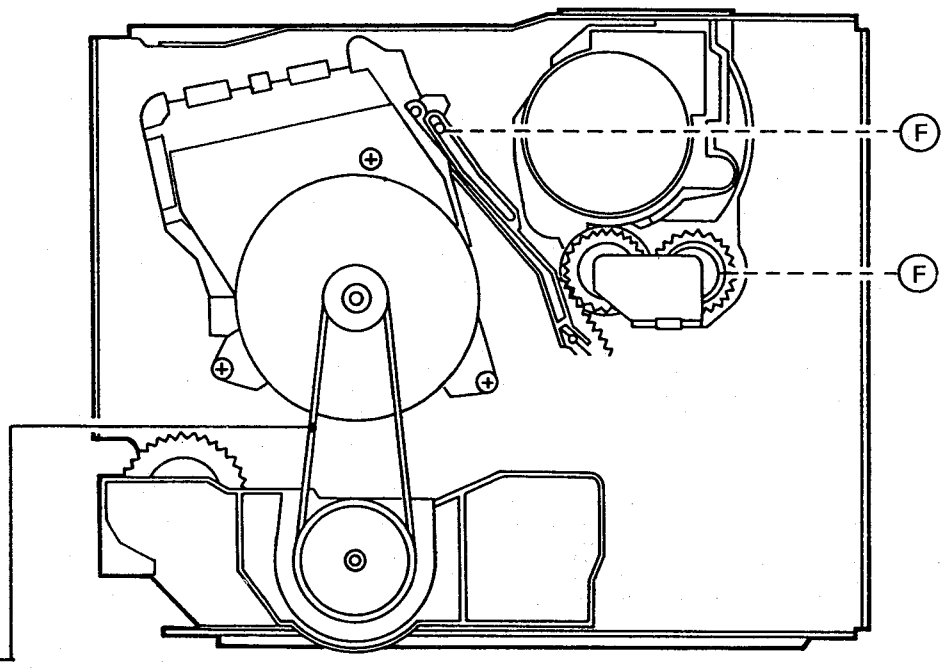


Fig. 3 Bottom View of Mechanism

Note:
If locations marked with "o" do not operate normally after cleaning, they are worn. Replace.
See the EXPLODED VIEWS at the end of this manual as well as the above illustrations for the sections to be lubricated and greased.

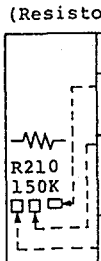
Ⓢ : Sonic Slidas oil (#1600)
Ⓕ : Froil (G31SAY)

SCHEMATIC/CIRCUIT BOARD DIAGRAMS

BEFORE USING THIS SERVICE REFERENCE MATERIAL

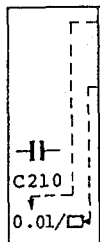
How to read abbreviations

(Resistors)



	Value	Not indicated .. Ω(ohm) K ..... kΩ
	Toler-ance	Not indicated .. ±5% K ..... ±10% M ..... ±20%
	Wattage	Not indicated .. 1/8W (All values other than 1/8W are indicated in the schematic diagrams with W omitted)
	Sort	Not indicated .. Carbon film RC ..... Carbon solid RW ..... Wire wound RS ..... Metal oxide film RN ..... Metal film
Example: R120 ..... 150kohm, carbon solid RC1/2K 1/2W, ±10%		

(Capacitors)



	Value	Not indicated .. μF P ..... PF
	Dielect-ric strength	Not indicated .. 50WV (All values other than 50WV and electrolytic capacitors are indicated in the schematic diagrams with WV omitted)
	Toler-ance	Not indicated .. ±10% J ..... ±5% M ..... ±20% C ..... ±0.25PF Z ..... +80% -20% (No tolerance is indicated for electrolytic capacitors (excluding tantalum and high stability electrolytic capacitors))
	Sort	Not indicated .. Ceramic General electrolytic (distinguished from ceramic with circuit symbol) MYL ..... Mylar (polyester film) STY ..... Styrol TA ..... Tantalum KU ..... High stability electrolytic MP ..... Metalized paper
Example: C210 0.01/25 ... Mylar, 0.01μF, 25WV, ±5% MYL J		

Notes:

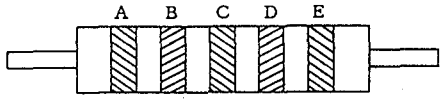
1. Voltages are measured with the negative ⊖ terminal of the power supply as reference in the normal operating mode. The voltages in different modes are indicated in the schematic diagrams; those in parentheses ( ) are in the record mode and those without parentheses are in the play mode.
2. The value, dielectric strength (wattage), tolerance and sort of resistors (excluding variable resistors, etc.) and capacitors are indicated in the schematic diagrams by abbreviations. Replace them correctly, comparing the abbreviations in the schematic diagrams and the table "how to read abbreviations".

Cautions on use of MOS IC

1. The MOS IC is inserted in black foam for shipment. This foam is a conductor which short-circuits between the leads to prevent damage. Do not remove ICs from this foam during their storage. Avoid removing ICs from this foam, placing them on plastic which is likely to be charged with static electricity or inserting them into styrol foam.
2. High voltages may be applied during soldering caused by leakages from the soldering iron, so be sure to ground the tip of the soldering iron or use a low voltage soldering iron.
3. The human body, clothes made of synthetic fibres or nylon gloves may be charged with several thousands volts of static electricity because of friction, so a worker should be earthed.
4. Be sure to earth measuring instruments such as oscilloscopes, VTVMs, etc. used for repairs.

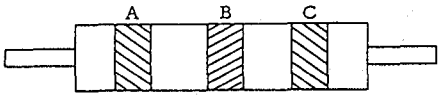
How to read capacity and inductance of resistor shape capacitors and coils

CAPACITOR



CAPACITY: (10A+B) x C (PF)
TOLERANCE: D
RATED VOLTAGE: BODY COLOUR
PINK: 25V
GREEN: 50V
CHARACTERISTICS: E

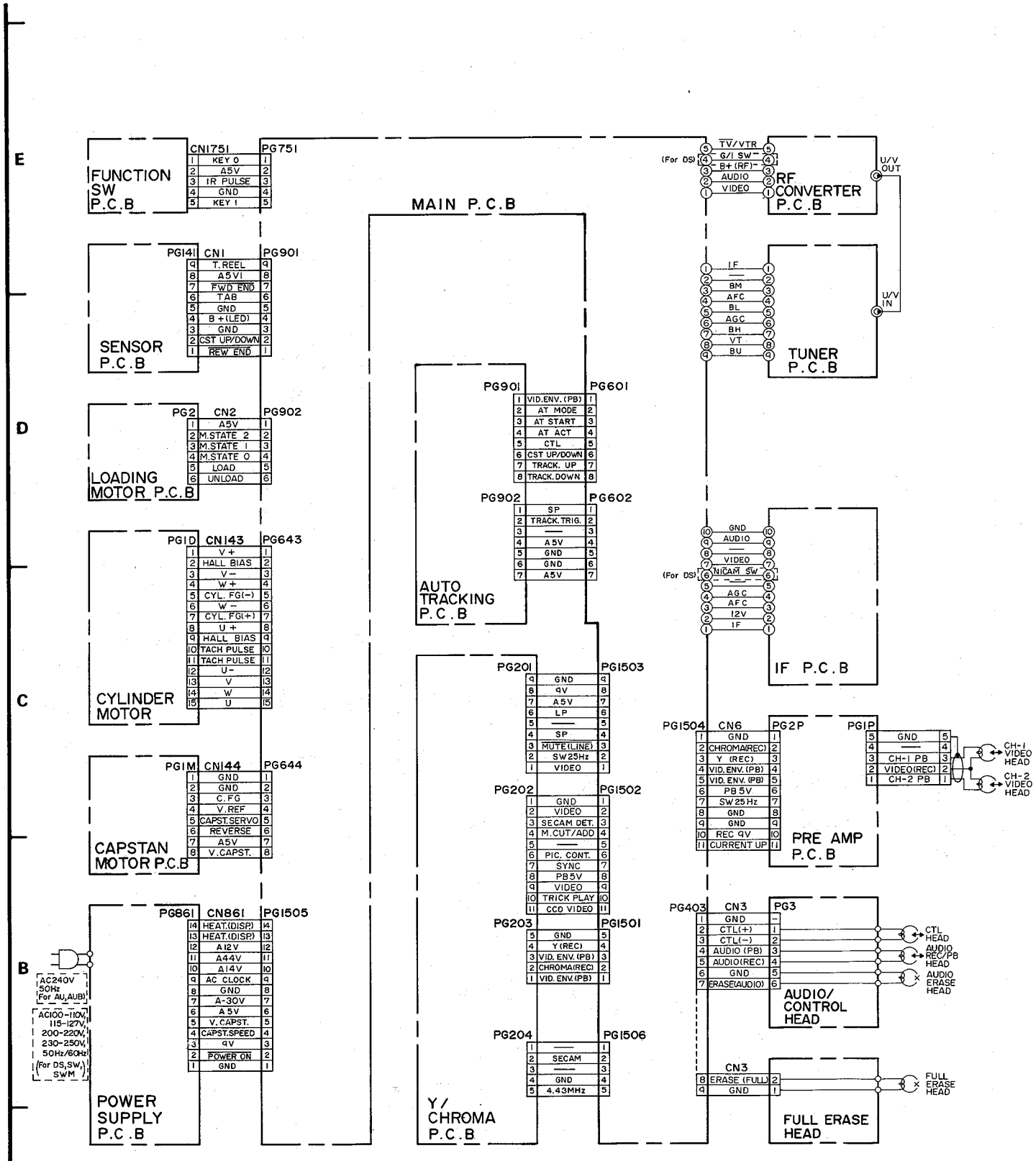
COIL



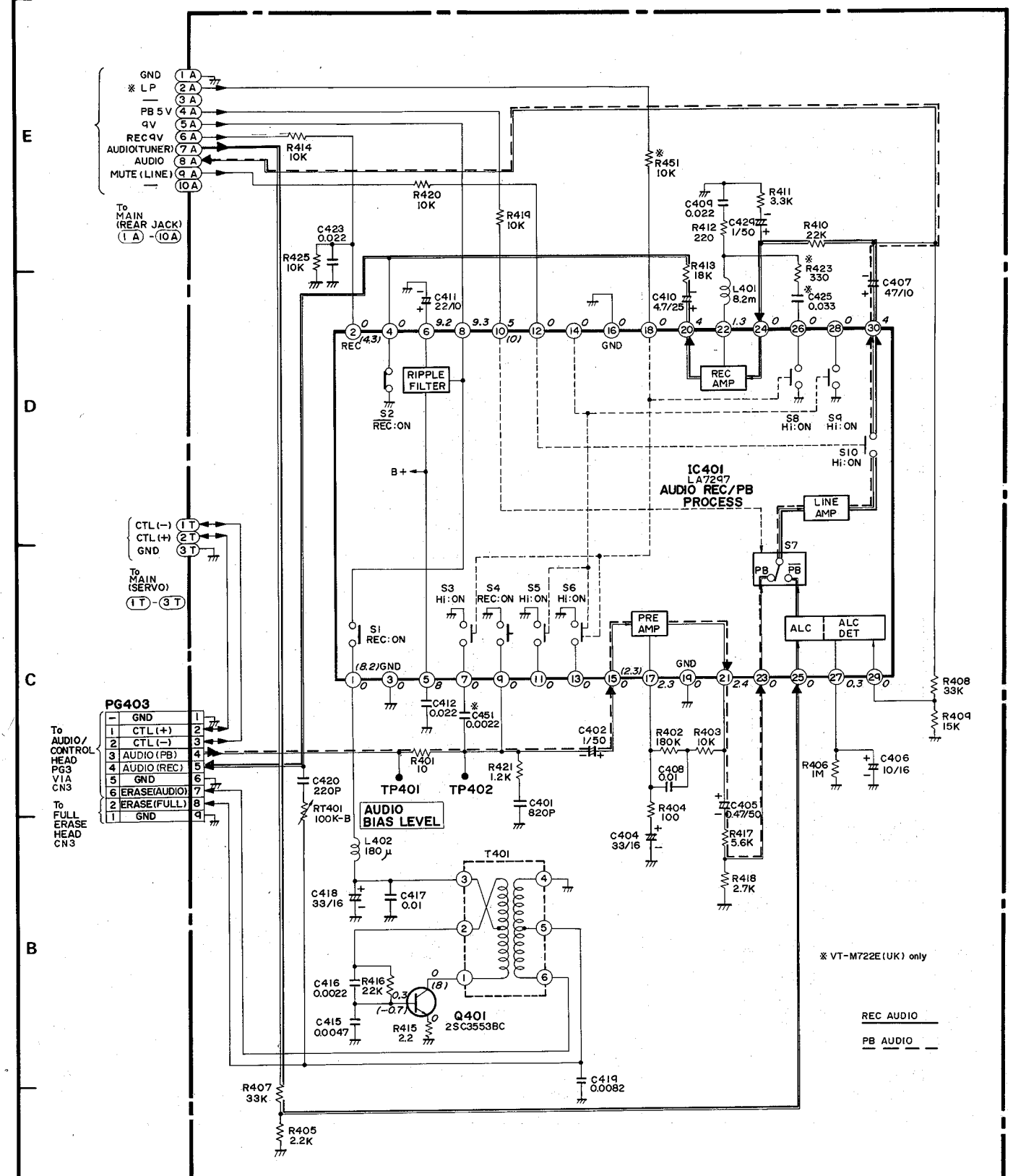
INDUCTANCE: (10A+B) x C (μH)

COLOUR	A,B	C	D	E
Black	0	10^0	±20%	For temperature compensation
Brown	1	10^1		
Red	2	10^2		
Orange	3	10^3		
Yellow	4	10^4		
Green	5	10^5		
Blue	6			
Violet	7			
Grey	8		±30%	High dielectric constant type
White	9			For temperature compensation
Gold		10^{-1}	±5%	
Silver		10^{-2}	±10%	High dielectric constant type

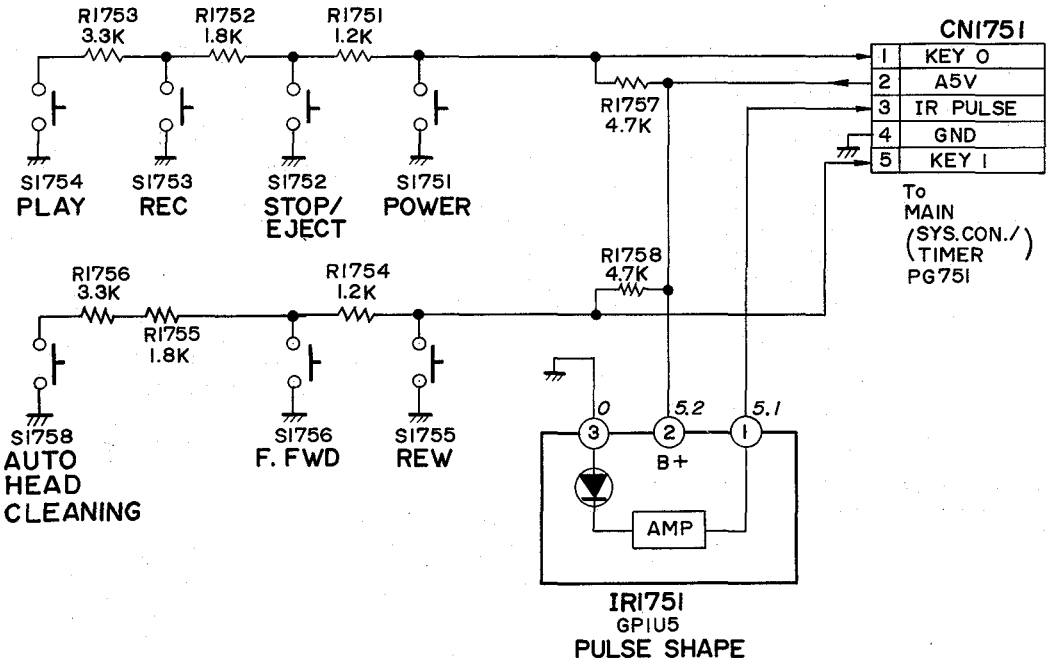
INTERNAL WIRING DIAGRAM



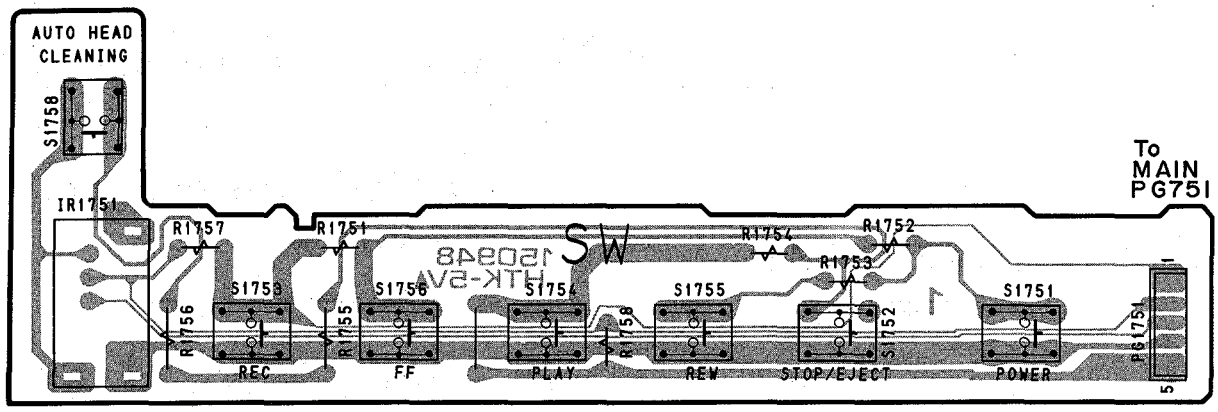
AUDIO (MAIN) SCHEMATIC DIAGRAM



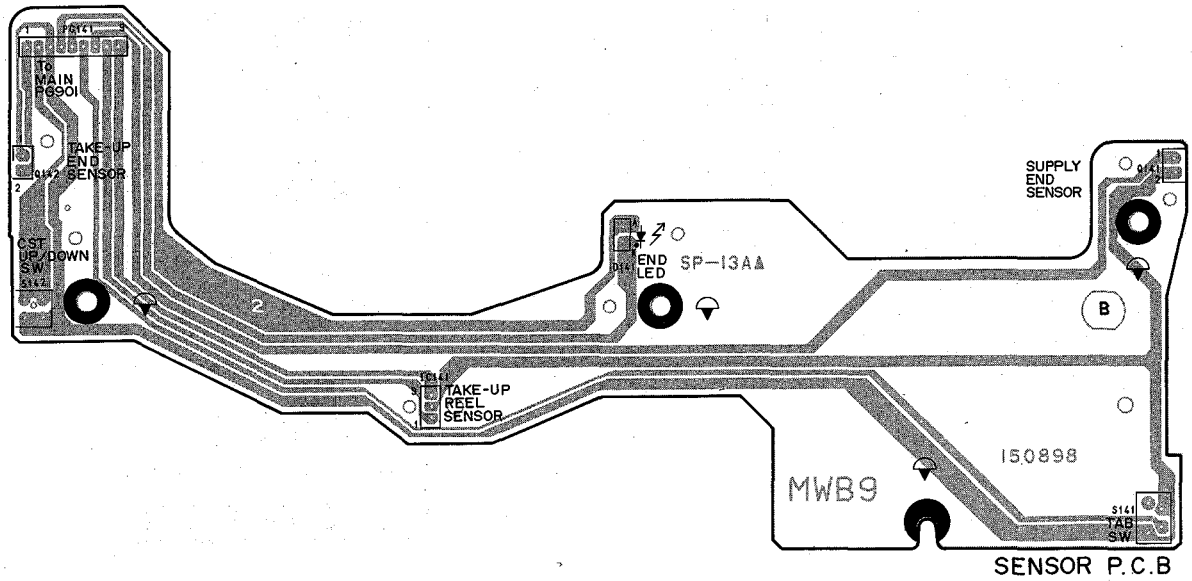
FUNCTION SWITCH SCHEMATIC DIAGRAM



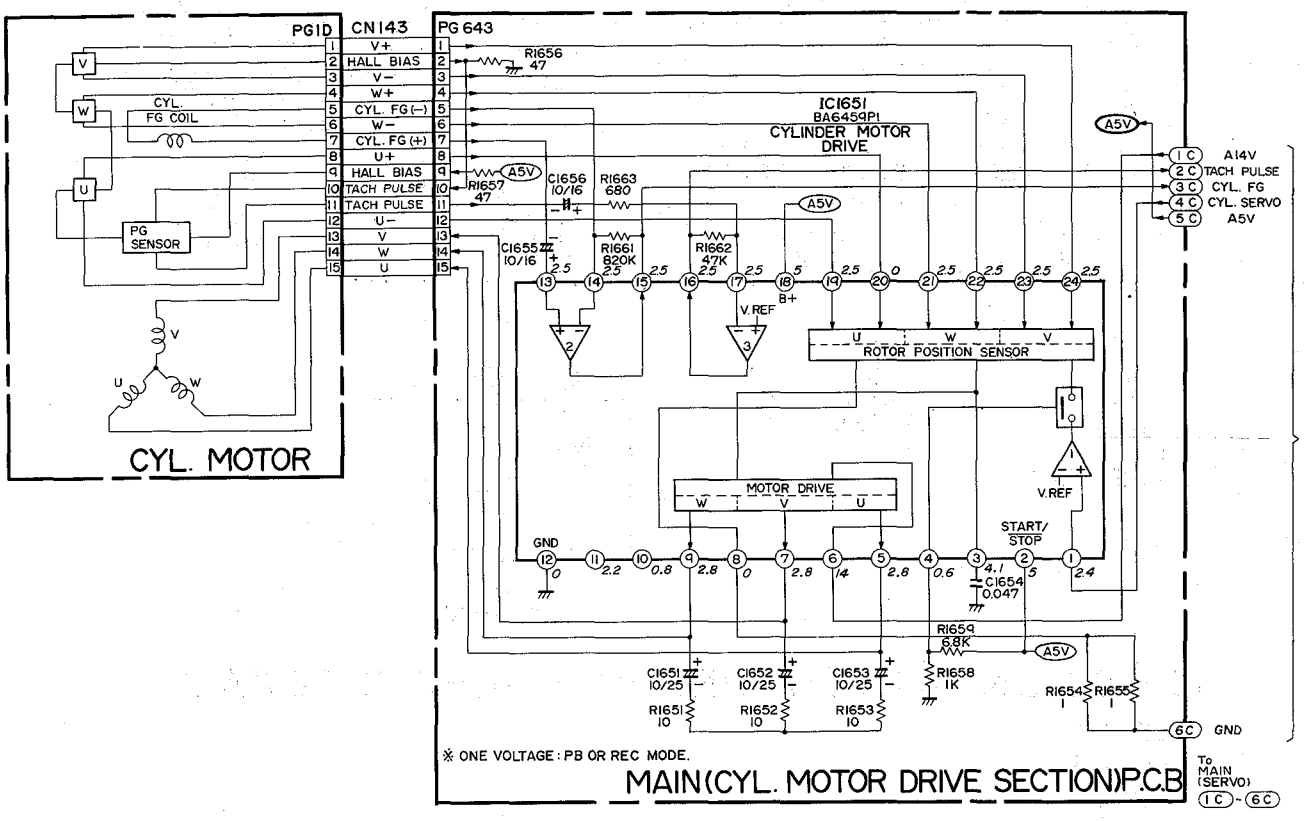
FUNCTION SWITCH CIRCUIT BOARD DIAGRAM



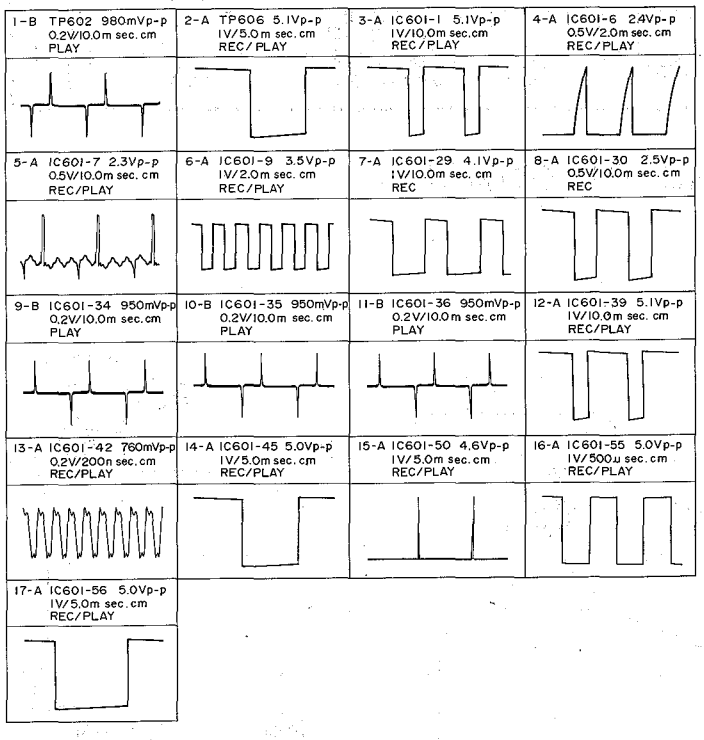
SENSOR CIRCUIT BOARD DIAGRAM



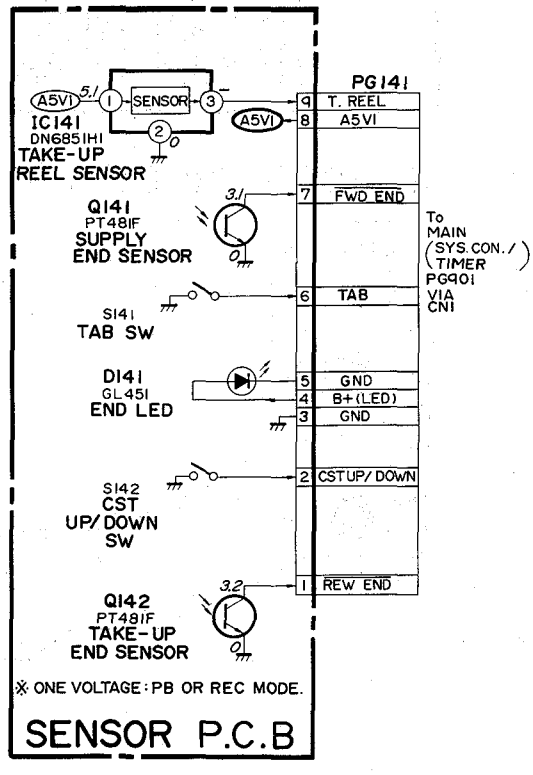
CYL. MOTOR DRIVE (MAIN) SCHEMATIC DIAGRAM



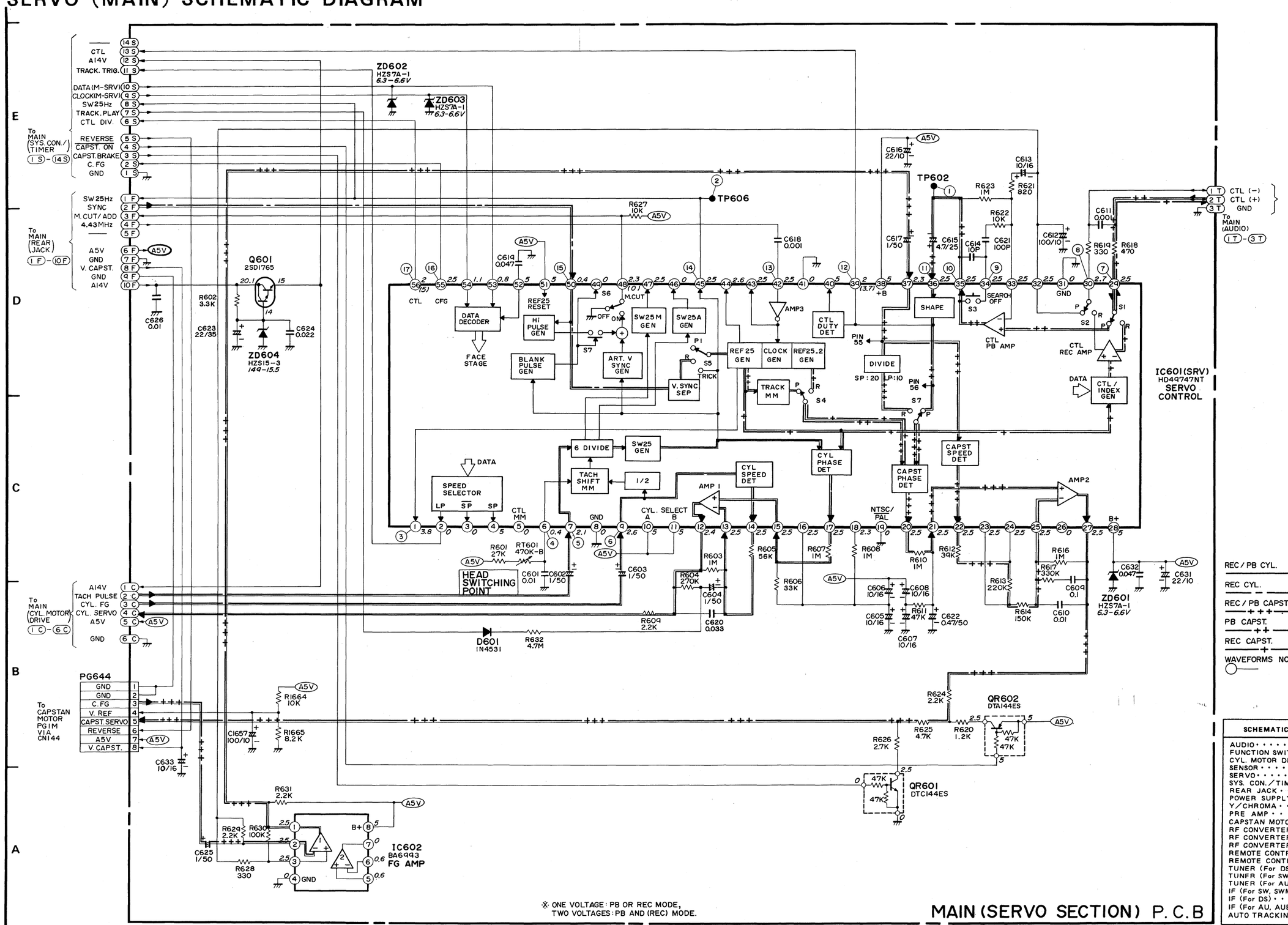
SERVO WAVEFORMS



SENSOR SCHEMATIC DIAGRAM



SERVO (MAIN) SCHEMATIC DIAGRAM

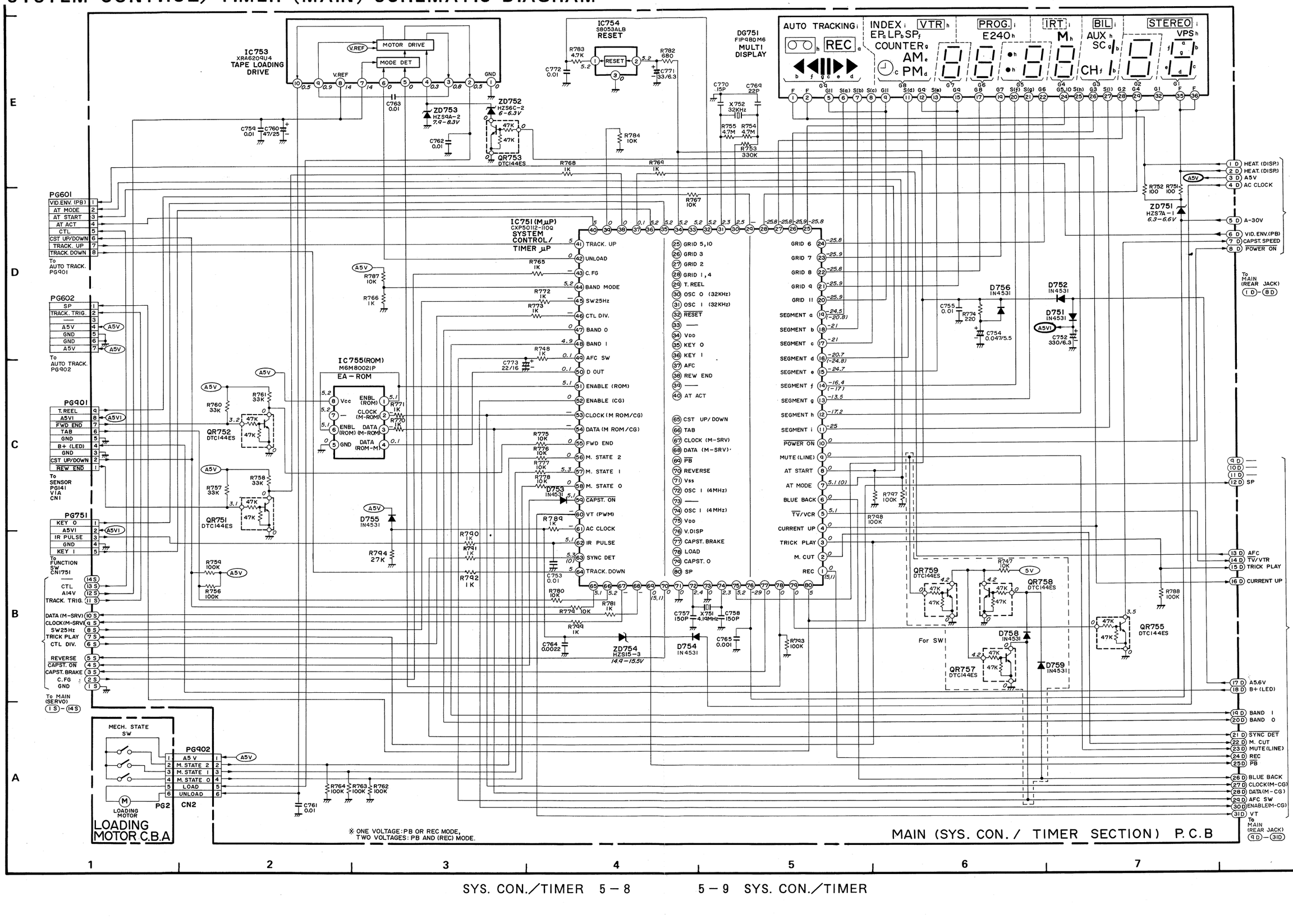


※ ONE VOLTAGE : PB OR REC MODE,
TWO VOLTAGES : PB AND (REC) MODE.

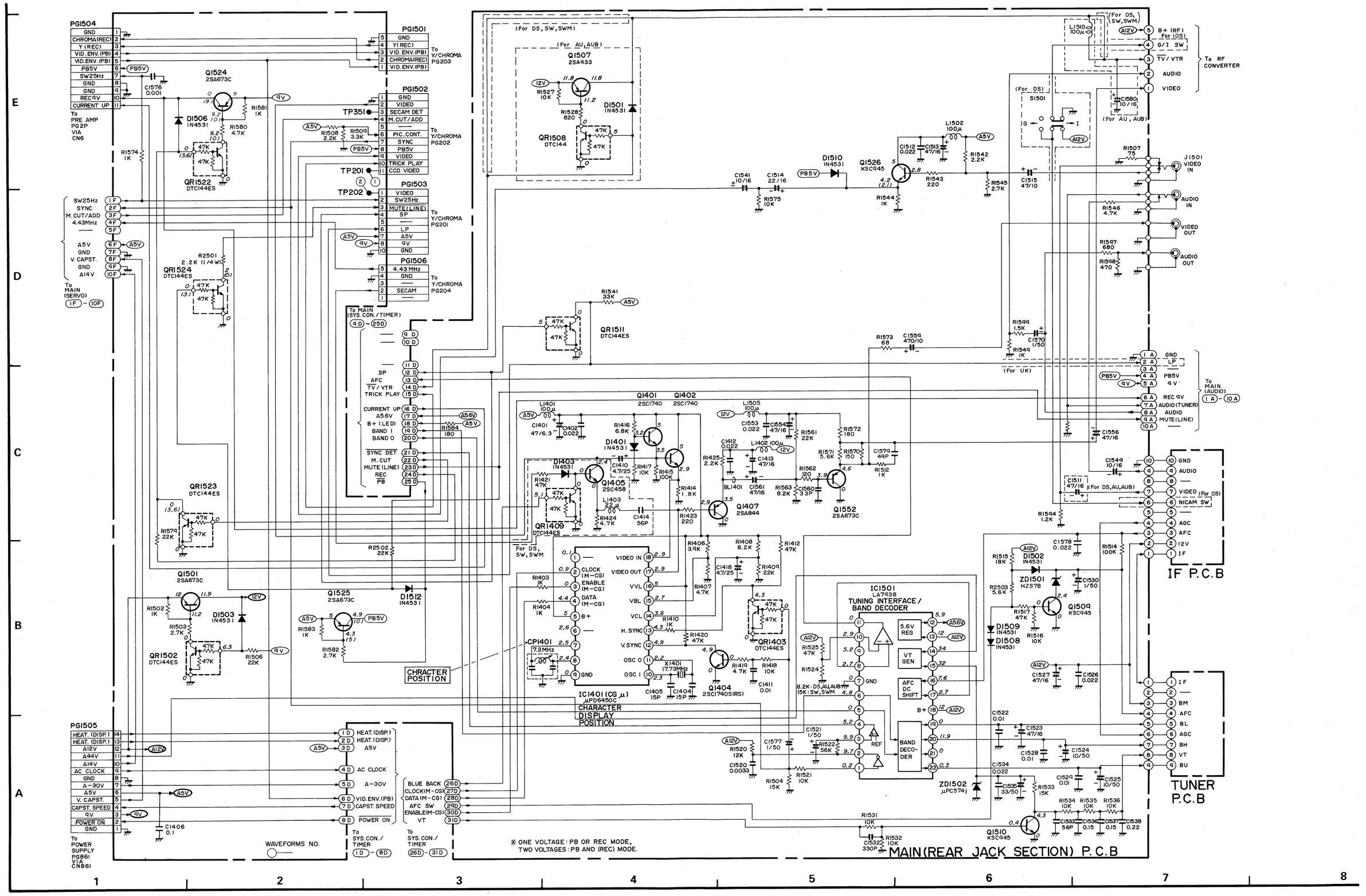
MAIN (SERVO SECTION) P.C.B

SCHEMATIC DIAGRAM	ITEM
AUDIO	5 – 3
FUNCTION SWITCH	5 – 4
CYL. MOTOR DRIVE	5 – 5
SENSOR	5 – 5
SERVO	5 – 6
SYS. CON. / TIMER	5 – 8
REAR JACK	5 – 10
POWER SUPPLY	5 – 12
Y / CHROMA	5 – 16
PRE AMP	5 – 20
CAPSTAN MOTOR	5 – 20
RF CONVERTER (For DS)	5 – 21
RF CONVERTER (For SW, SWM)	5 – 21
RF CONVERTER (For AU, AUB)	5 – 22
REMOTE CONTROL (For DS, SW, SWM, AU)	5 – 22
REMOTE CONTROL (For AUB)	5 – 23
TUNER (For DS)	5 – 24
TUNER (For SW, SWM)	5 – 25
TUNER (For AU, AUB)	5 – 26
IF (For SW, SWM)	5 – 27
IF (For DS)	5 – 27
IF (For AU, AUB)	5 – 28
AUTO TRACKING	5 – 29

SYSTEM CONTROL/TIMER (MAIN) SCHEMATIC DIAGRAM

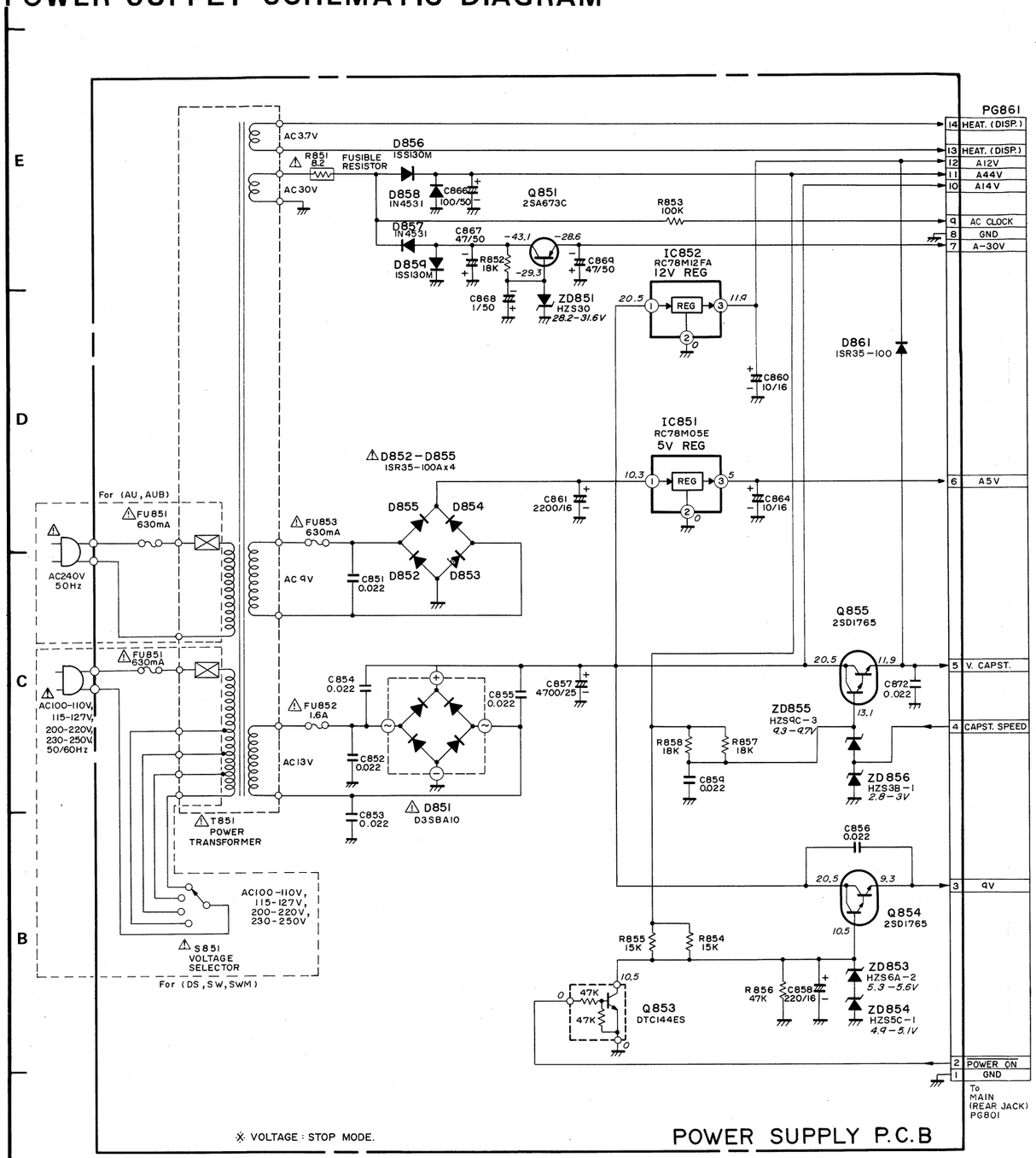


REAR JACK (MAIN) SCHEMATIC DIAGRAM

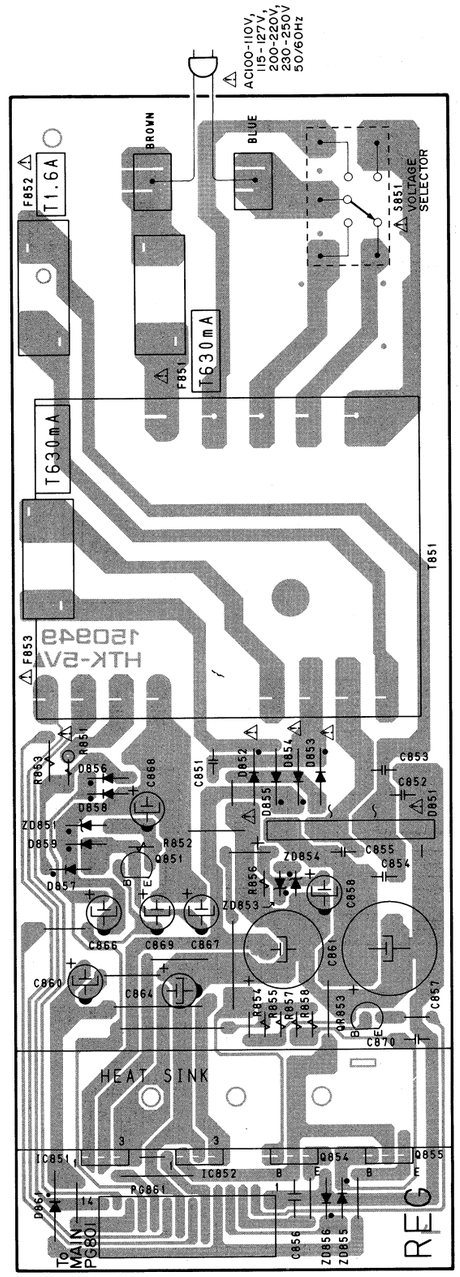


REAR JACK 5 — 10 5 — 11 REAR JACK

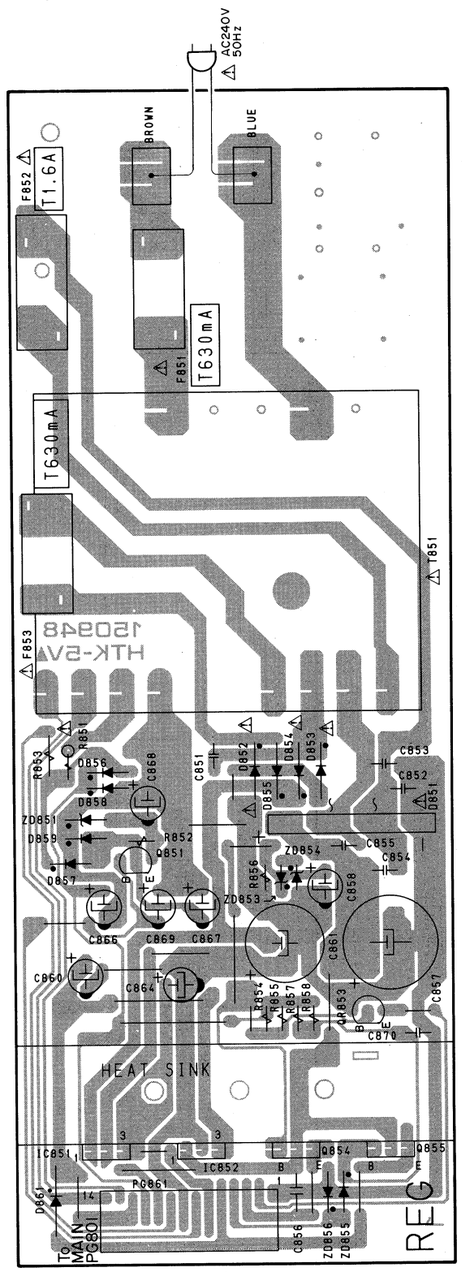
POWER SUPPLY SCHEMATIC DIAGRAM



POWER SUPPLY CIRCUIT BOARD DIAGRAMS

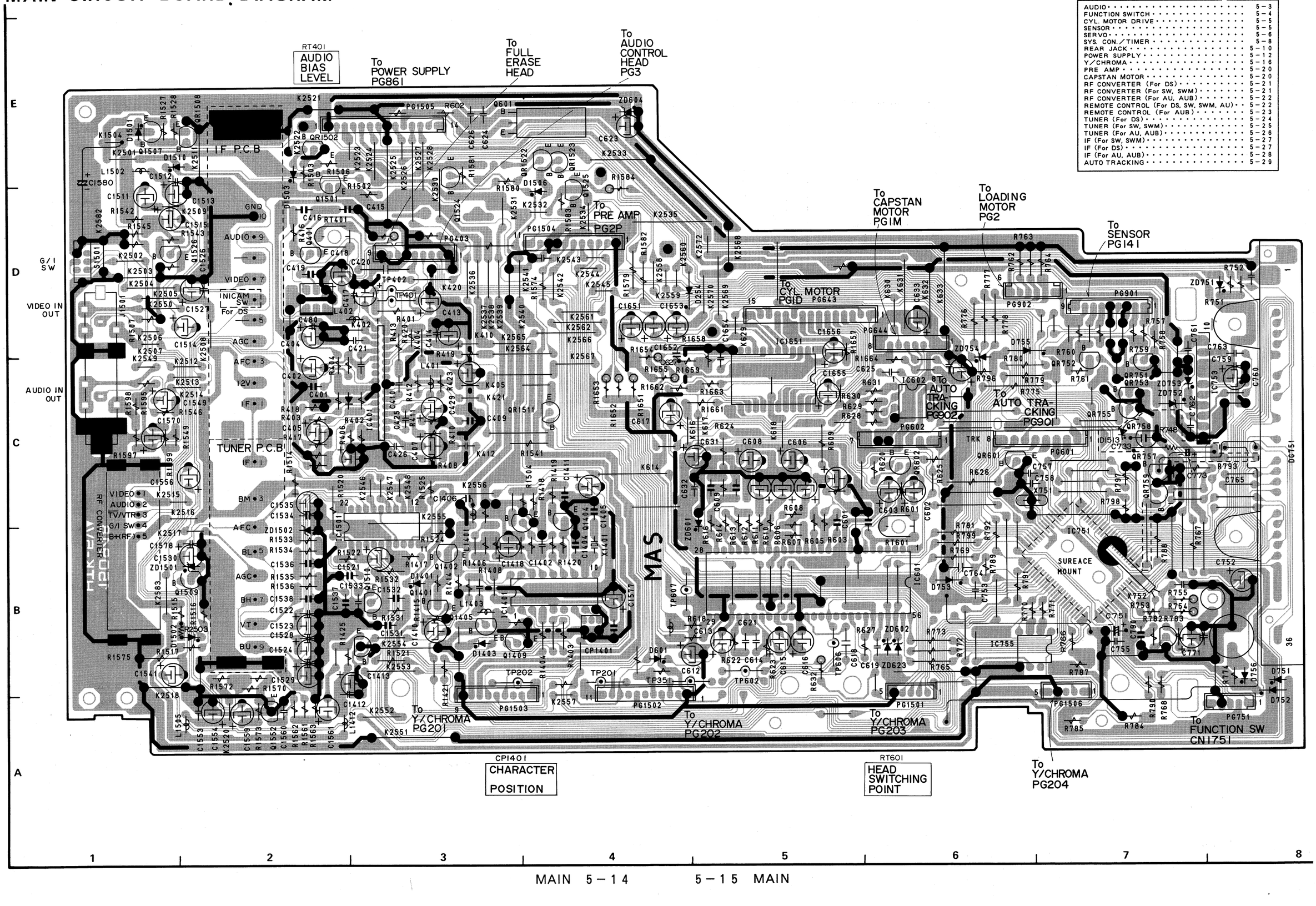


(For DS, SW, SWM)



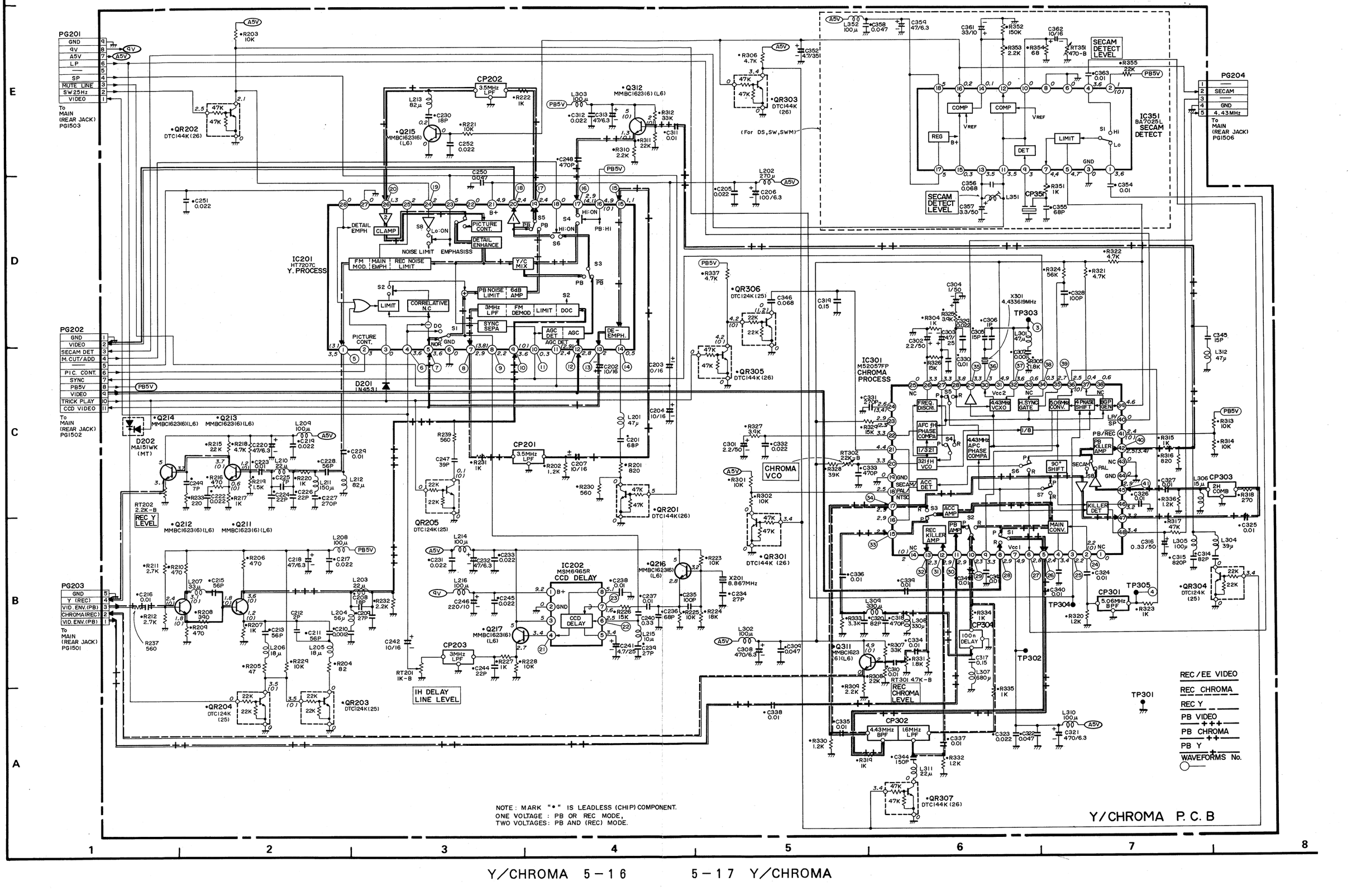
(For AU, AUB)

MAIN CIRCUIT BOARD DIAGRAM



SCHEMATIC DIAGRAM	ITEM
AUDIO	5 – 3
FUNCTION SWITCH	5 – 4
CYL. MOTOR DRIVE	5 – 5
SENSOR	5 – 5
SERVO	5 – 6
SYS. CON./TIMER	5 – 8
REAR JACK	5 – 10
POWER SUPPLY	5 – 12
Y/CHROMA	5 – 16
PRE AMP	5 – 20
CAPSTAN MOTOR	5 – 20
RF CONVERTER (For DS)	5 – 21
RF CONVERTER (For SW, SWM)	5 – 21
RF CONVERTER (For AU, AUB)	5 – 22
REMOTE CONTROL (For DS, SW, SWM, AU)	5 – 22
REMOTE CONTROL (For AUB)	5 – 23
TUNER (For DS)	5 – 24
TUNER (For SW, SWM)	5 – 25
TUNER (For AU, AUB)	5 – 26
IF (For SW, SWM)	5 – 27
IF (For DS)	5 – 27
IF (For AU, AUB)	5 – 28
AUTO TRACKING	5 – 29

Y/CHROMA SCHEMATIC DIAGRAM

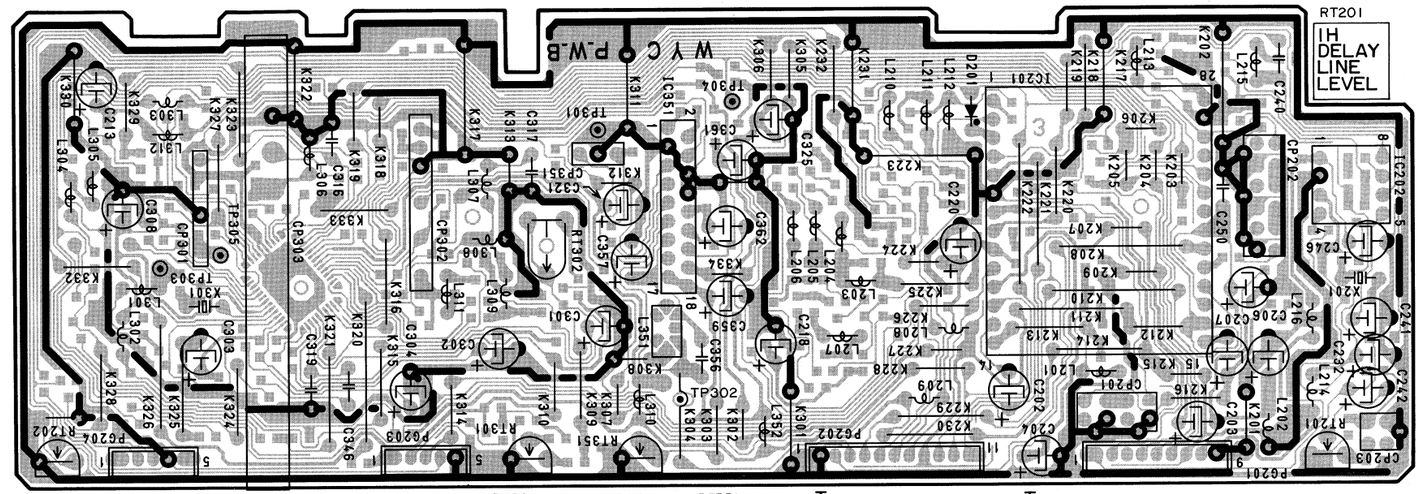


Y/CHROMA WAVEFORMS

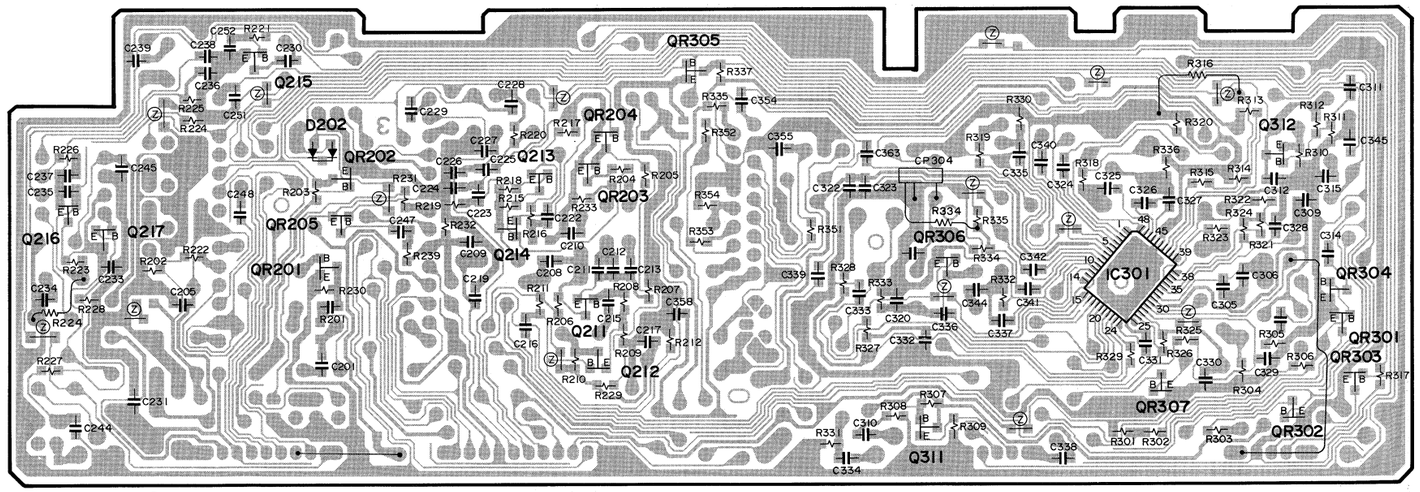
1-B TP201 450mVp-p 0.1V/20.0μ sec.cm PLAY	2-B TP202 450mVp-p 0.1V/20.0μ sec.cm PLAY	3-A TP303 870mVp-p 0.2V/200n sec.cm REC/PLAY	4-A TP305 400mVp-p 0.1V/200n sec.cm REC/PLAY	5-A IC201-1 640mVp-p 0.2V/20.0μ sec.cm REC	6-B IC201-4 460mVp-p 0.1V/20.0μ sec.cm PLAY
7-B IC201-5 460mVp-p 0.1V/20.0μ sec.cm PLAY	8-B IC201-7 760mVp-p 0.2V/20.0μ sec.cm PLAY	9-B IC201-8 440mVp-p 0.1V/20.0μ sec.cm PLAY	10-B IC201-9 540mVp-p 0.2V/5.0m sec.cm PLAY	11-A IC201-10 4.4Vp-p 1V/20.0μ sec.cm REC/PLAY	12-A IC201-12 500mVp-p 0.1V/20.0μ sec.cm REC/PLAY
13-B IC201-13 460mVp-p 0.1V/20.0μ sec.cm PLAY	14-B IC201-14 240mVp-p 50mV/20.0μ sec.cm PLAY	15-B IC201-15 240mVp-p 50mV/20.0μ sec.cm PLAY	16-B IC201-17 400mVp-p 0.1V/20.0μ sec.cm PLAY	17-A IC201-19 1.1Vp-p 0.2V/20.0μ sec.cm REC	17-B IC201-19 1.1Vp-p 0.2V/20.0μ sec.cm PLAY
18-A IC201-20 1.9Vp-p 0.5V/20.0μ sec.cm REC/PLAY	19-A IC201-24 4.4Vp-p 1V/5.0m sec.cm REC/PLAY	20-A IC201-26 570mVp-p 0.2V/20.0μ sec.cm REC/PLAY	21-B IC202-4 1.5Vp-p 0.5V/20.0μ sec.cm PLAY	22-B IC202-6 430mVp-p 0.1V/20.0μ sec.cm PLAY	23-A IC202-7 230mVp-p 50mV/100n sec.cm REC/PLAY
24-A IC301-2 230mVp-p 50mV/200n sec.cm REC/PLAY	25-A IC301-3 4.2Vp-p 1V/5.0m sec.cm REC/PLAY	26-A IC301-5 500mVp-p 0.1V/20.0μ sec.cm REC	26-B IC301-5 1.8Vp-p 0.5V/20.0μ sec.cm PLAY	27-A IC301-6 560mVp-p 0.2V/20.0μ sec.cm REC	27-B IC301-6 1.1Vp-p 0.2V/20.0μ sec.cm PLAY
28-A IC301-8 520mVp-p 0.1V/20.0μ sec.cm REC	29-A IC301-10 970mVp-p 0.2V/20.0μ sec.cm REC	29-B IC301-10 400mVp-p 0.1V/20.0μ sec.cm PLAY	30-B IC301-11 180mVp-p 0.1V/20.0μ sec.cm PLAY	31-A IC301-12 320mVp-p 0.1V/20.0μ sec.cm REC	32-A IC301-13 480mVp-p 0.1V/20.0μ sec.cm REC
33-A IC301-15 290mVp-p 0.1V/20.0μ sec.cm REC	33-B IC301-15 150mVp-p 50mV/20.0μ sec.cm PLAY	34-A IC301-17 75mVp-p 50mV/20.0μ sec.cm REC	34-B IC301-17 190mVp-p 50mV/20.0μ sec.cm PLAY	35-A IC301-29 720mVp-p 0.2V/200n sec.cm REC/PLAY	36-A IC301-30 960mVp-p 0.2V/200n sec.cm REC/PLAY
37-A IC301-32 920mVp-p 0.2V/200n sec.cm REC/PLAY	38-A IC301-34 4.3Vp-p 1V/20.0μ sec.cm REC/PLAY	39-A IC301-36 1.1Vp-p 0.5V/20.0μ sec.cm REC/PLAY	40-B IC301-42 860mVp-p 0.2V/20.0μ sec.cm PLAY	41-B IC301-45 110mVp-p 50mV/20.0μ sec.cm PLAY	

SCHEMATIC DIAGRAM	ITEM
AUDIO	5-3
FUNCTION SWITCH	5-4
CYL. MOTOR DRIVE	5-5
SENSOR	5-5
SERVO	5-6
SYS. CON./TIMER	5-8
REAR JACK	5-10
POWER SUPPLY	5-12
Y/CHROMA	5-16
PRE AMP	5-20
CAPSTAN MOTOR	5-20
RF CONVERTER (For DS)	5-21
RF CONVERTER (For SW, SWM)	5-21
RF CONVERTER (For AU, AUB)	5-22
REMOTE CONTROL (For DS, SW, SWM, AU)	5-22
REMOTE CONTROL (For AUB)	5-23
TUNER (For DS)	5-24
TUNER (For SW, SWM)	5-25
TUNER (For AU, AUB)	5-26
IF (For SW, SWM)	5-27
IF (For DS)	5-27
IF (For AU, AUB)	5-28
AUTO TRACKING	5-29

Y/CHROMA CIRCUIT BOARD DIAGRAMS



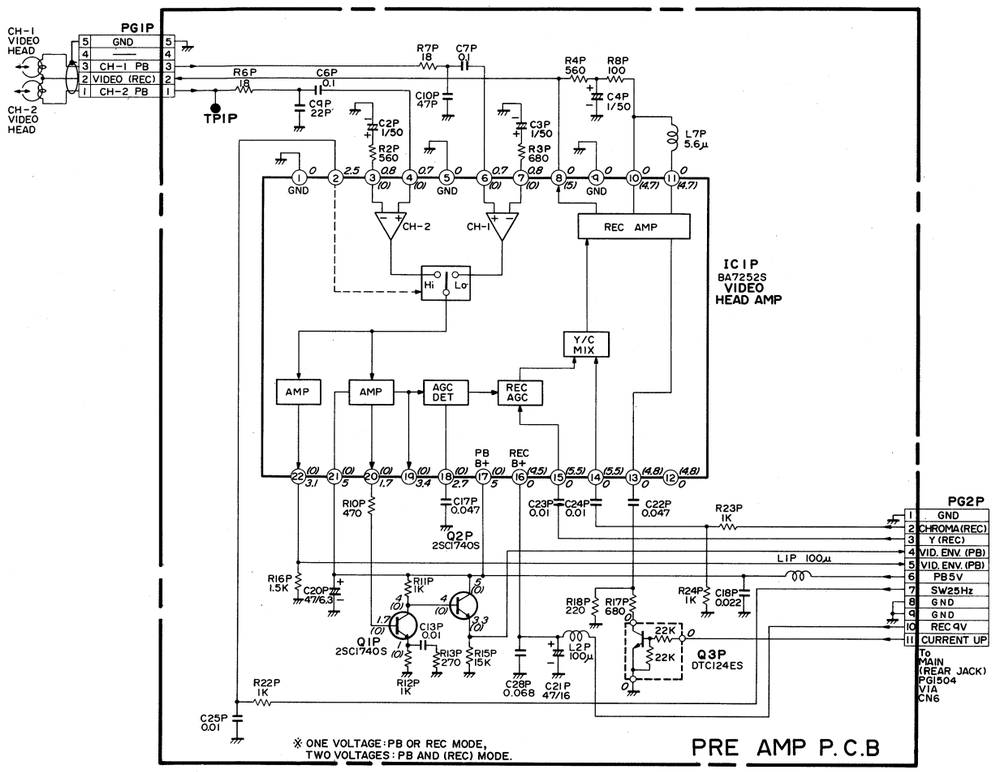
〔Components Side〕



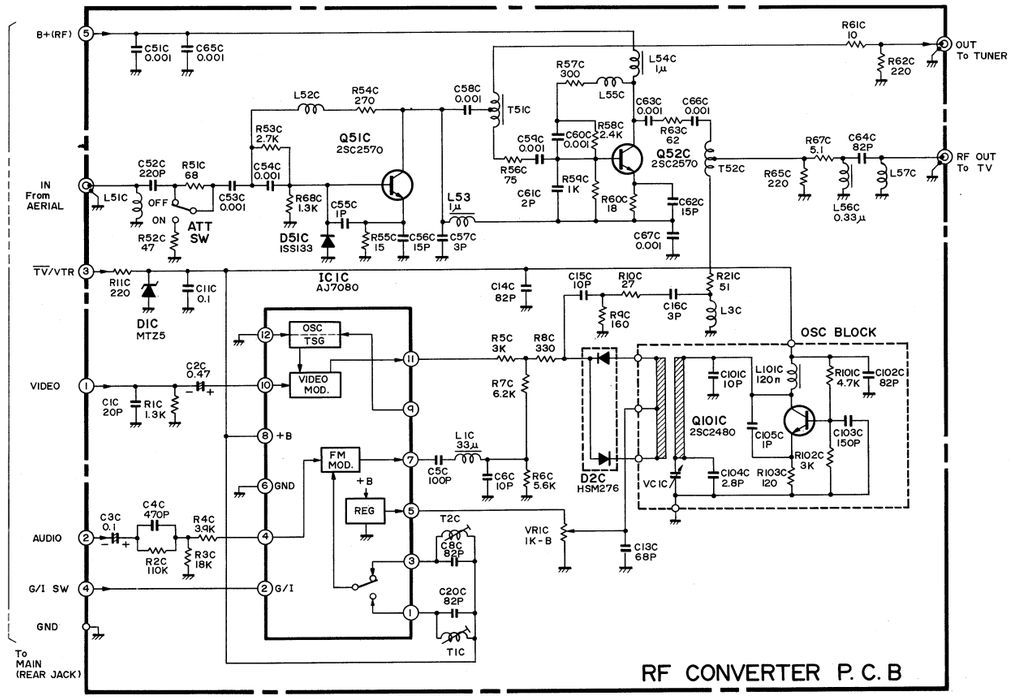
NOTE : MARK " Ⓩ " IS LEADLESS (CHIP) JUMPER.

〔Solder Side〕

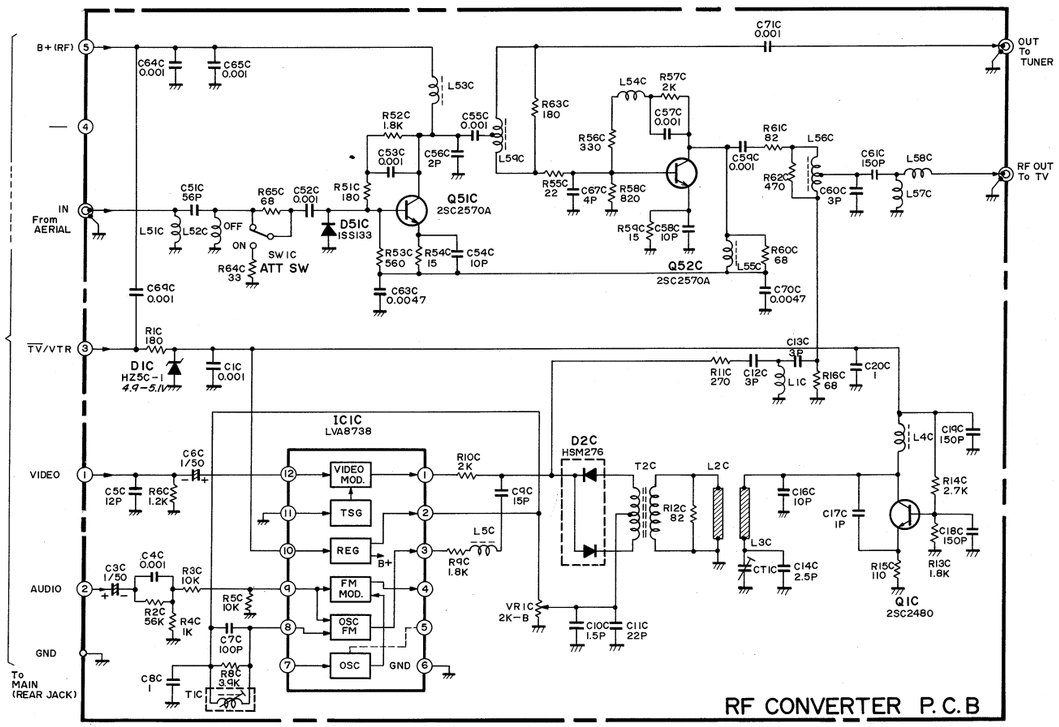
PRE AMP SCHEMATIC DIAGRAM



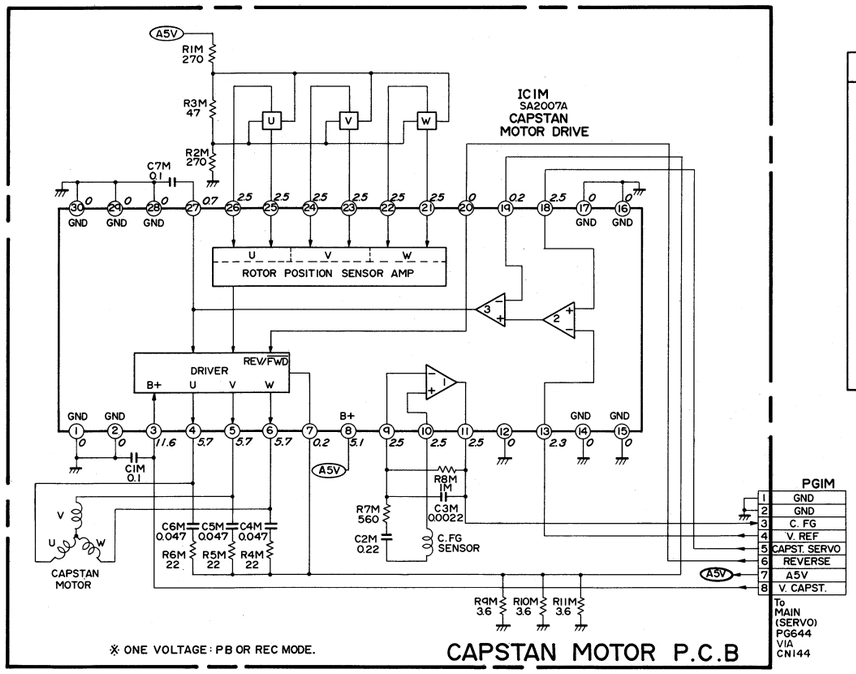
RF CONVERTER SCHEMATIC DIAGRAM (For DS)



RF CONVERTER SCHEMATIC DIAGRAM (For SW, SWM)

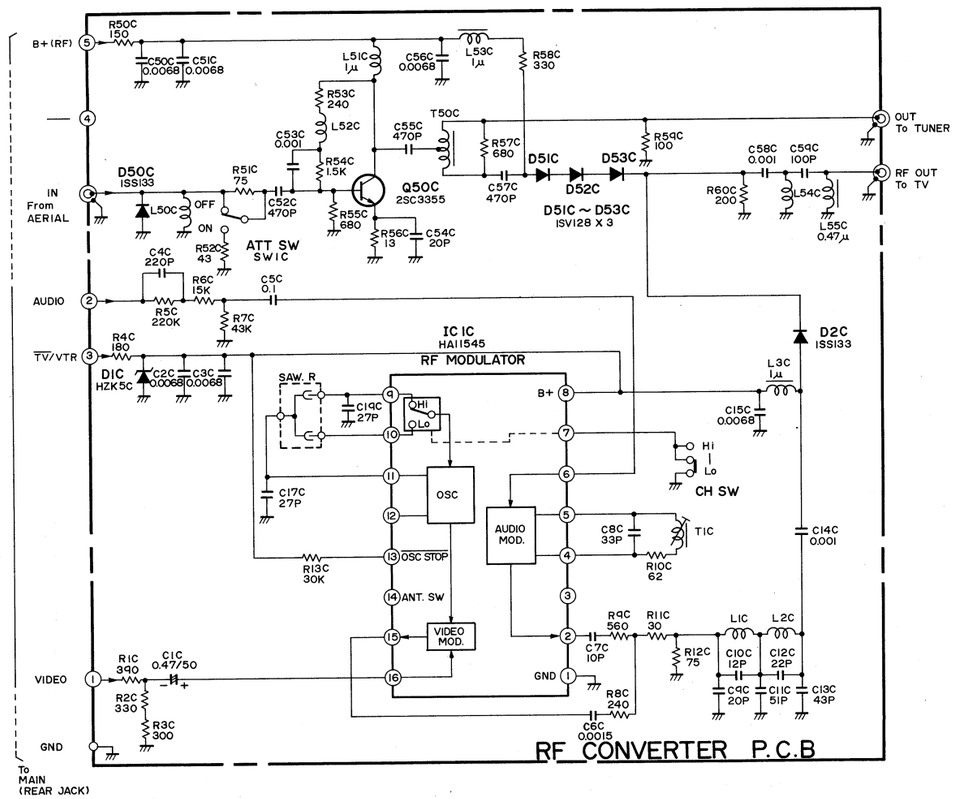


CAPSTAN MOTOR SCHEMATIC DIAGRAM

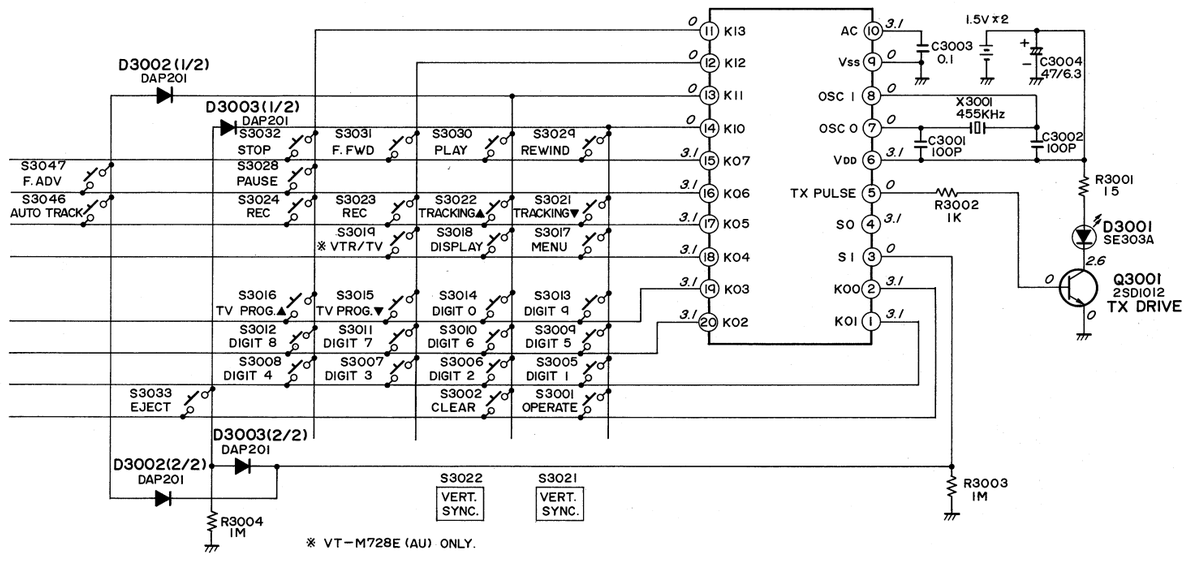


SCHEMATIC DIAGRAM	ITEM
AUDIO	5 – 3
FUNCTION SWITCH	5 – 4
CYL. MOTOR DRIVE	5 – 5
SENSOR	5 – 5
SERVO	5 – 6
SYS. CON./TIMER	5 – 8
REAR JACK	5 – 10
POWER SUPPLY	5 – 12
Y/CHROMA	5 – 16
PRE AMP	5 – 20
CAPSTAN MOTOR	5 – 20
RF CONVERTER (For DS)	5 – 21
RF CONVERTER (For SW, SWM)	5 – 21
RF CONVERTER (For AU, AUB)	5 – 22
REMOTE CONTROL (For DS, SW, SWM, AU)	5 – 22
REMOTE CONTROL (For AUB)	5 – 23
TUNER (For DS)	5 – 24
TUNER (For SW, SWM)	5 – 25
TUNER (For AU, AUB)	5 – 26
IF (For SW, SWM)	5 – 27
IF (For DS)	5 – 27
IF (For AU, AUB)	5 – 28
AUTO TRACKING	5 – 29

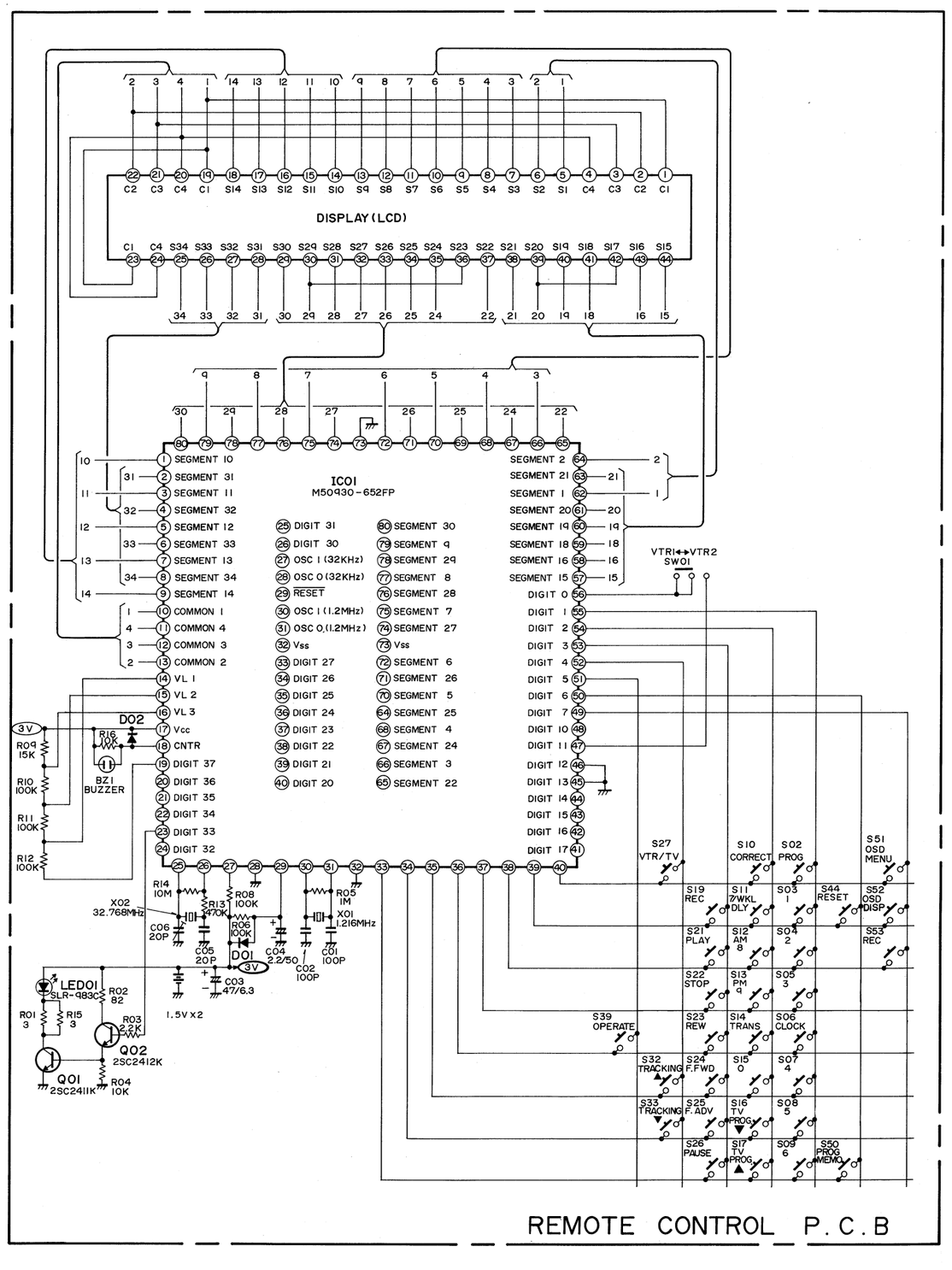
RF CONVERTER SCHEMATIC DIAGRAM (For AU, AUB)



REMOTE CONTROL SCHEMATIC DIAGRAM (For DS, SW, SWM, AU)



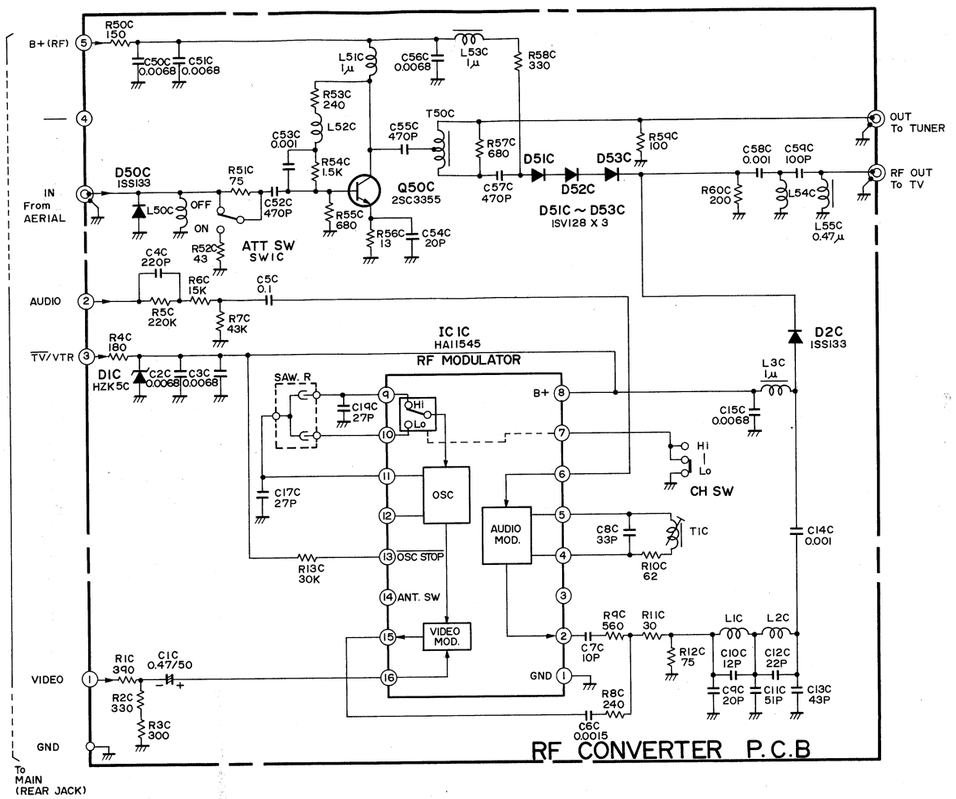
REMOTE CONTROL SCHEMATIC DIAGRAM (For AUB)



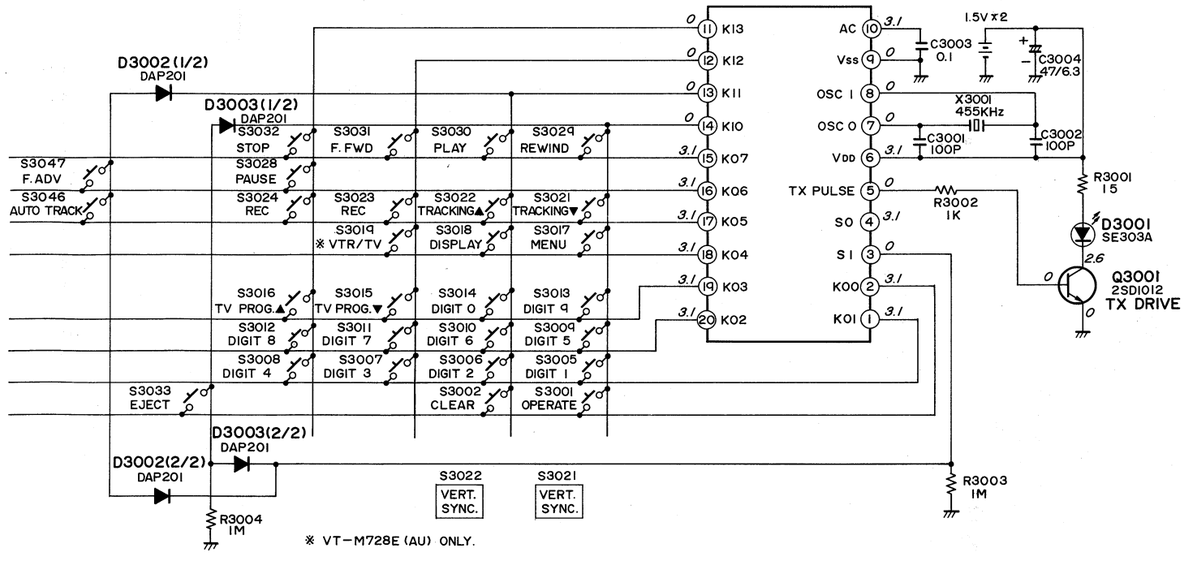
RF CONVERTER(For AU, AUB), REMO. CON.(For DS, SW, SWM, AU) 5 — 2 2

5 — 2 3 REMOTE CONTROL(For AUB)

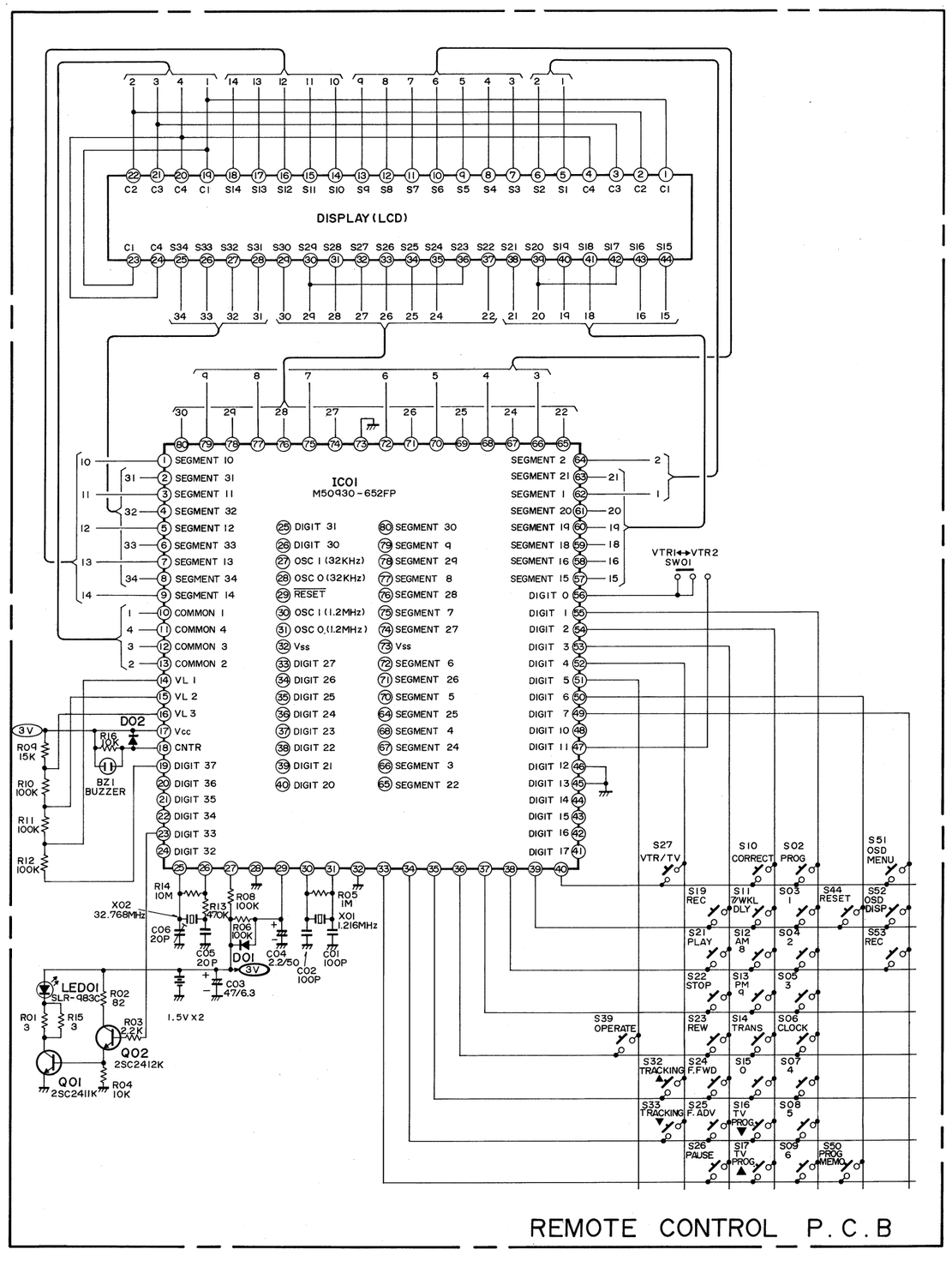
RF CONVERTER SCHEMATIC DIAGRAM (For AU, AUB)



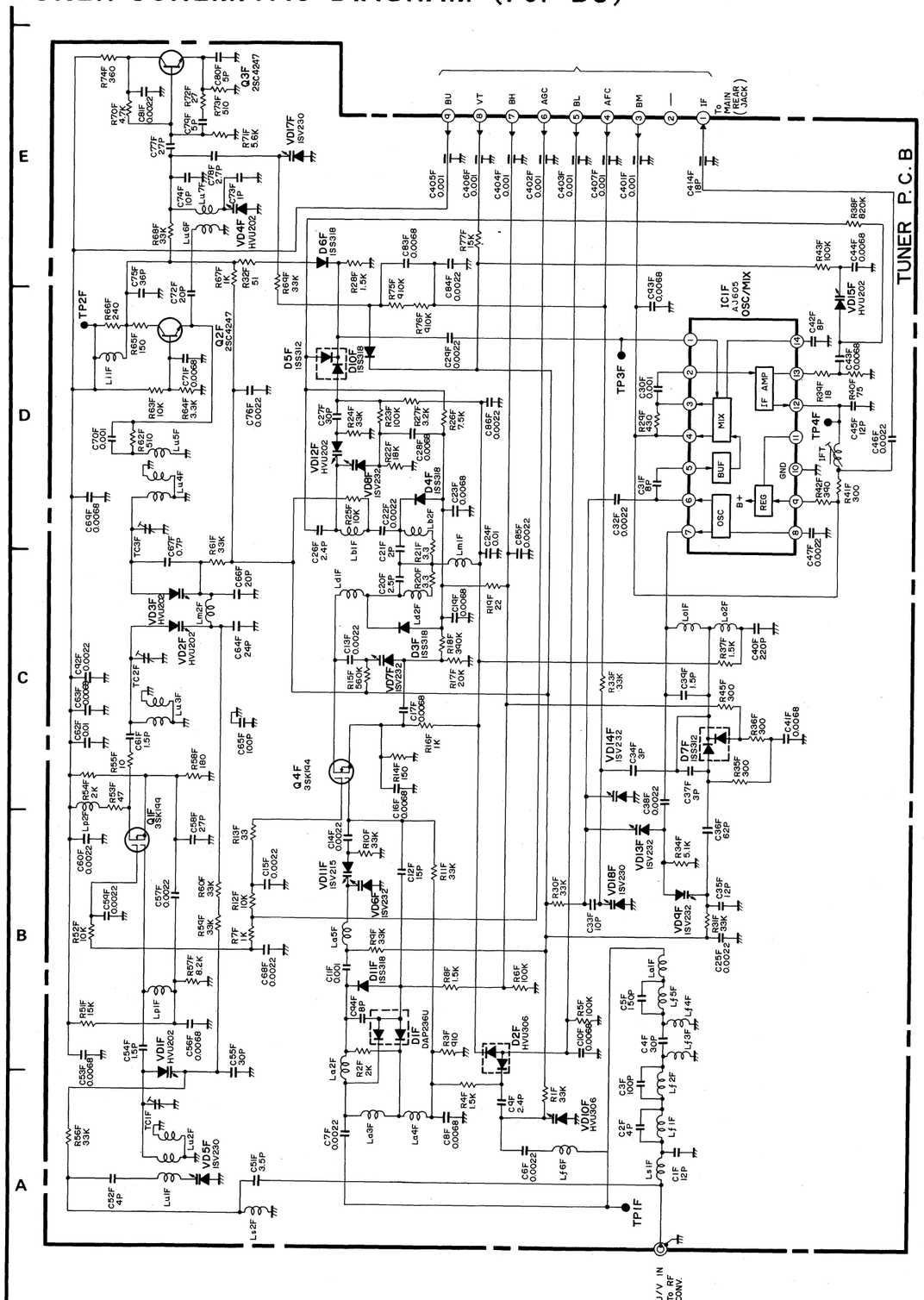
REMOTE CONTROL SCHEMATIC DIAGRAM (For DS, SW, SWM, AU)



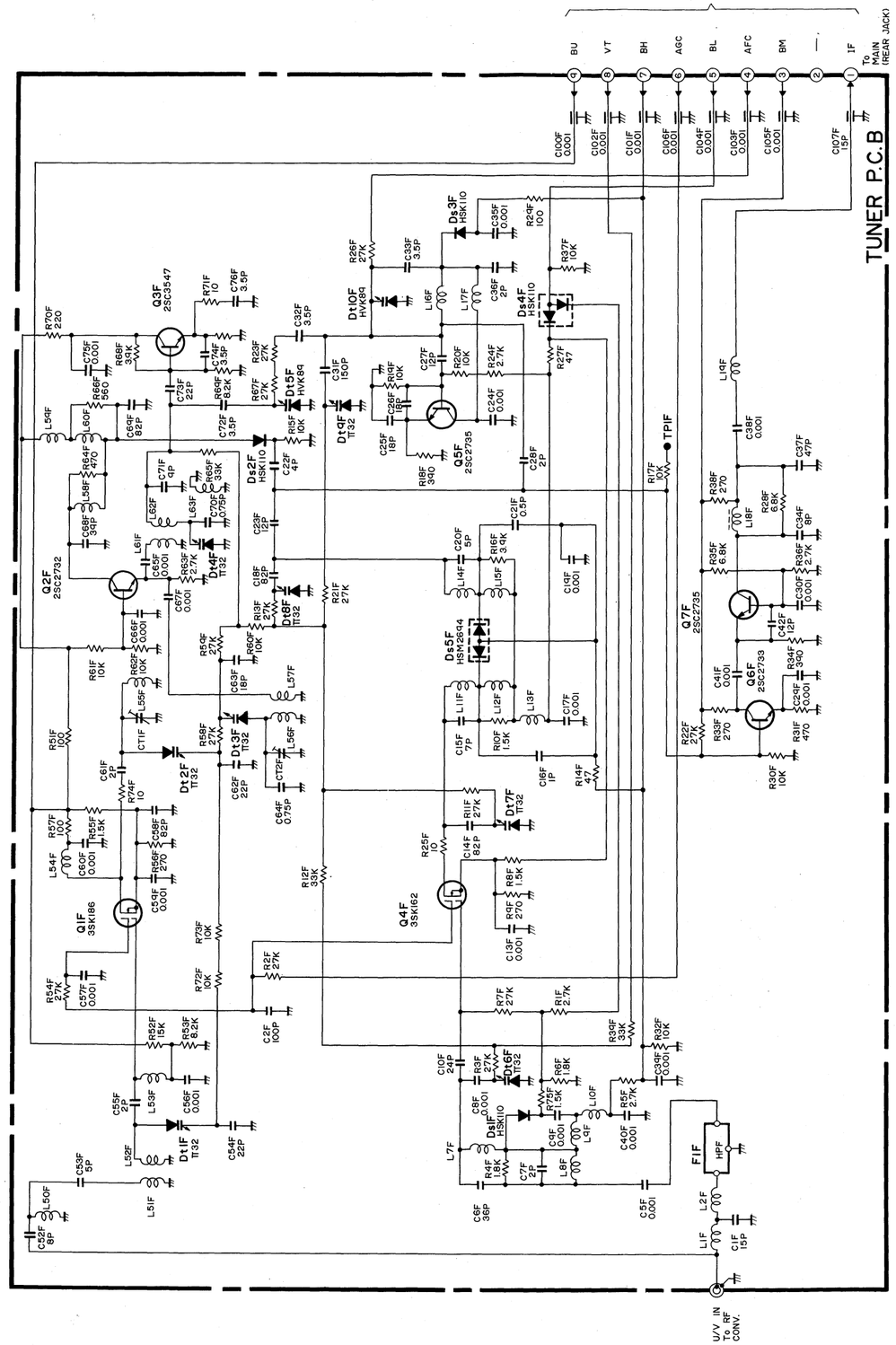
REMOTE CONTROL SCHEMATIC DIAGRAM (For AUB)



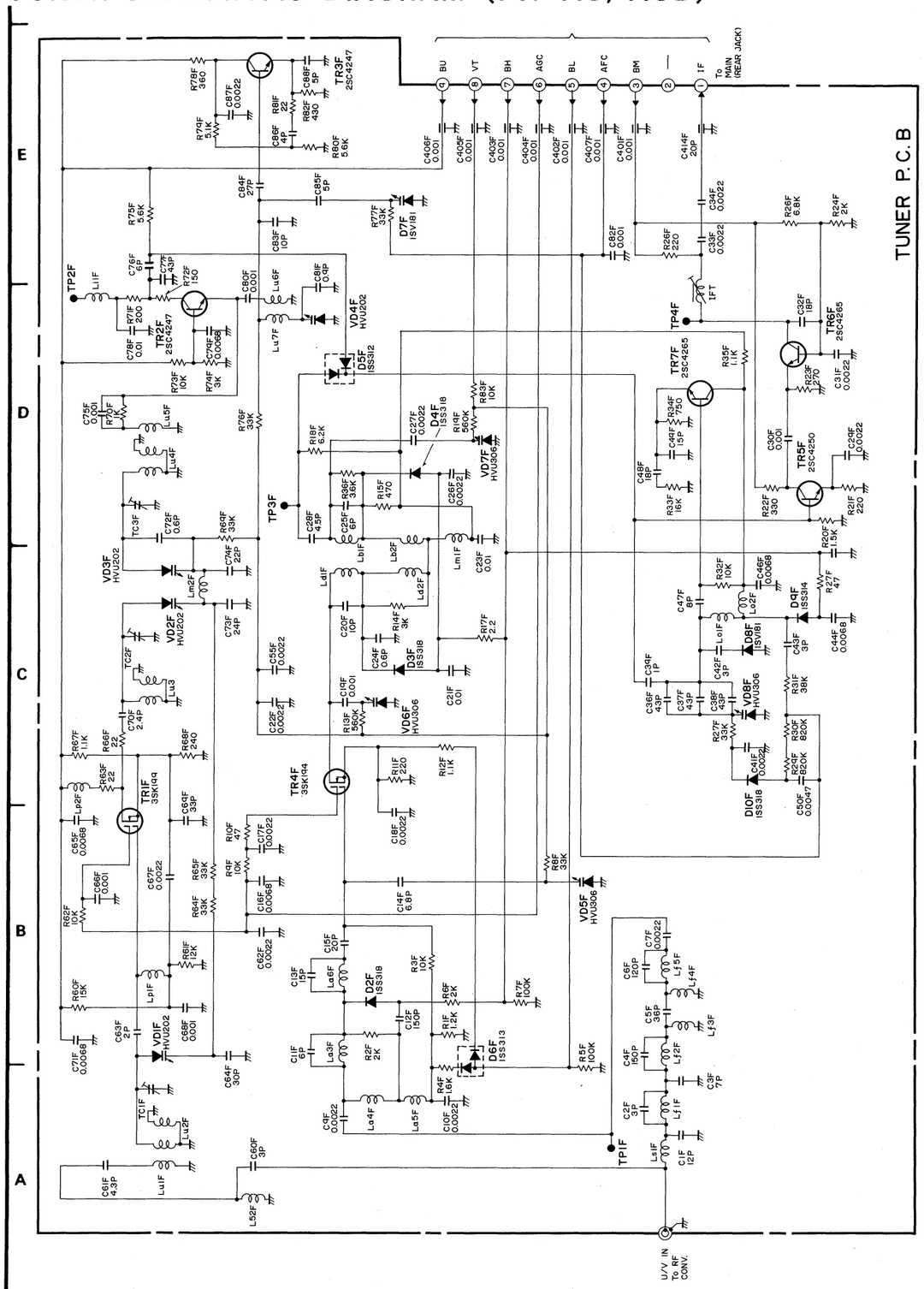
TUNER SCHEMATIC DIAGRAM (For DS)



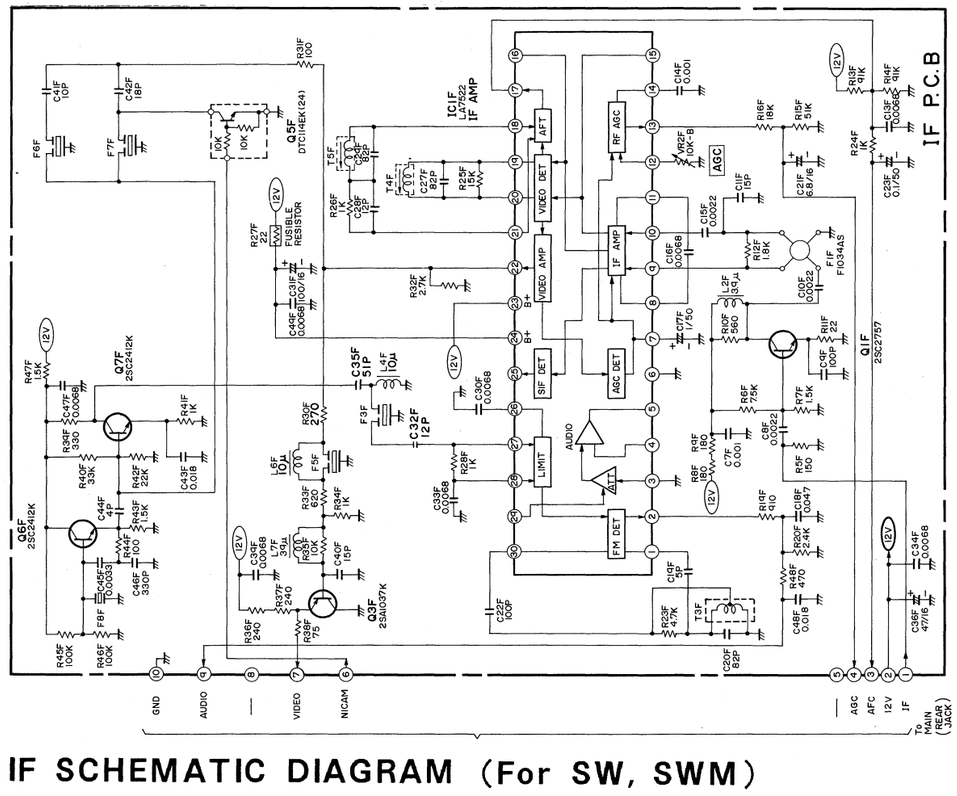
TUNER SCHEMATIC DIAGRAM (For SW, SWM)



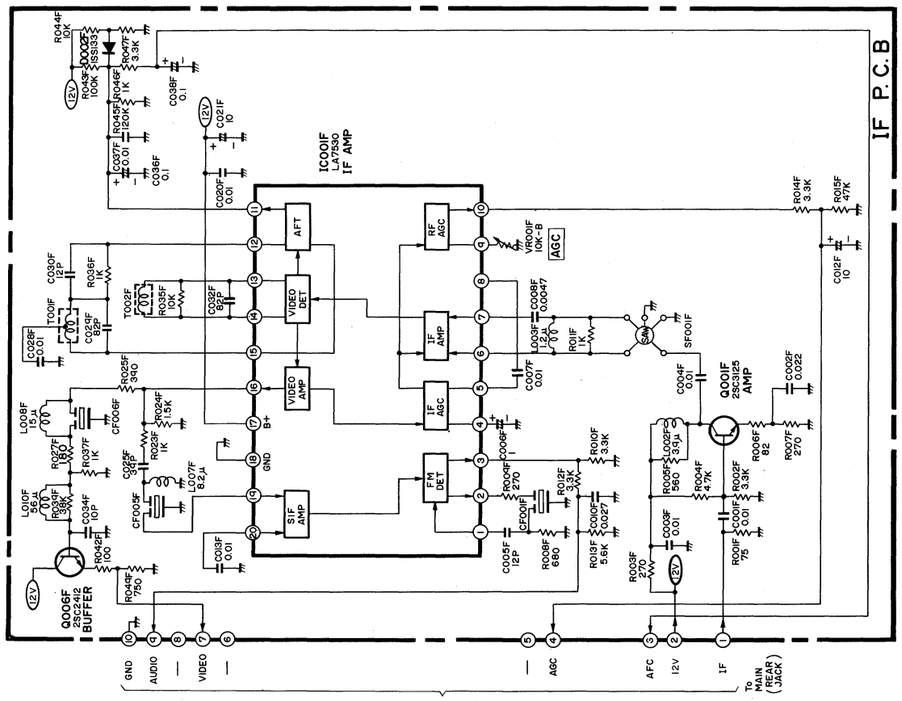
TUNER SCHEMATIC DIAGRAM (For AU, AUB)



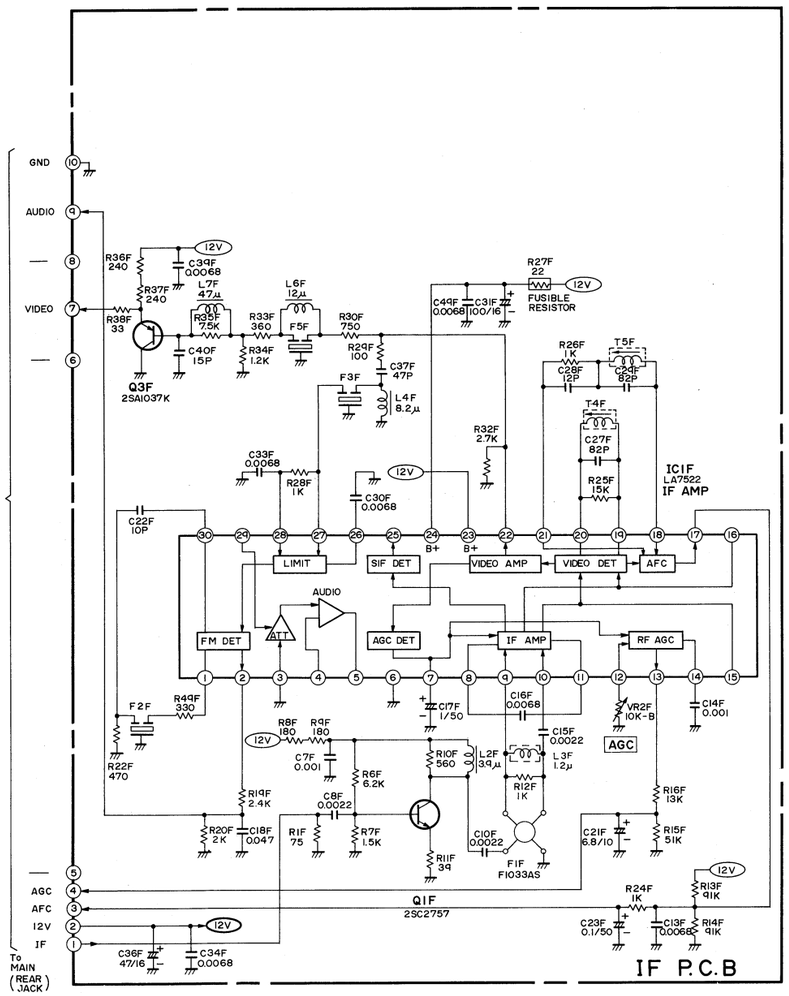
IF SCHEMATIC DIAGRAM (For DS)



IF SCHEMATIC DIAGRAM (For SW, SWM)

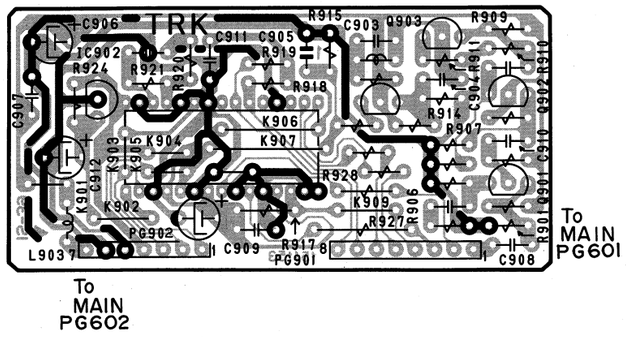


IF SCHEMATIC DIAGRAM (For AU, AUB)

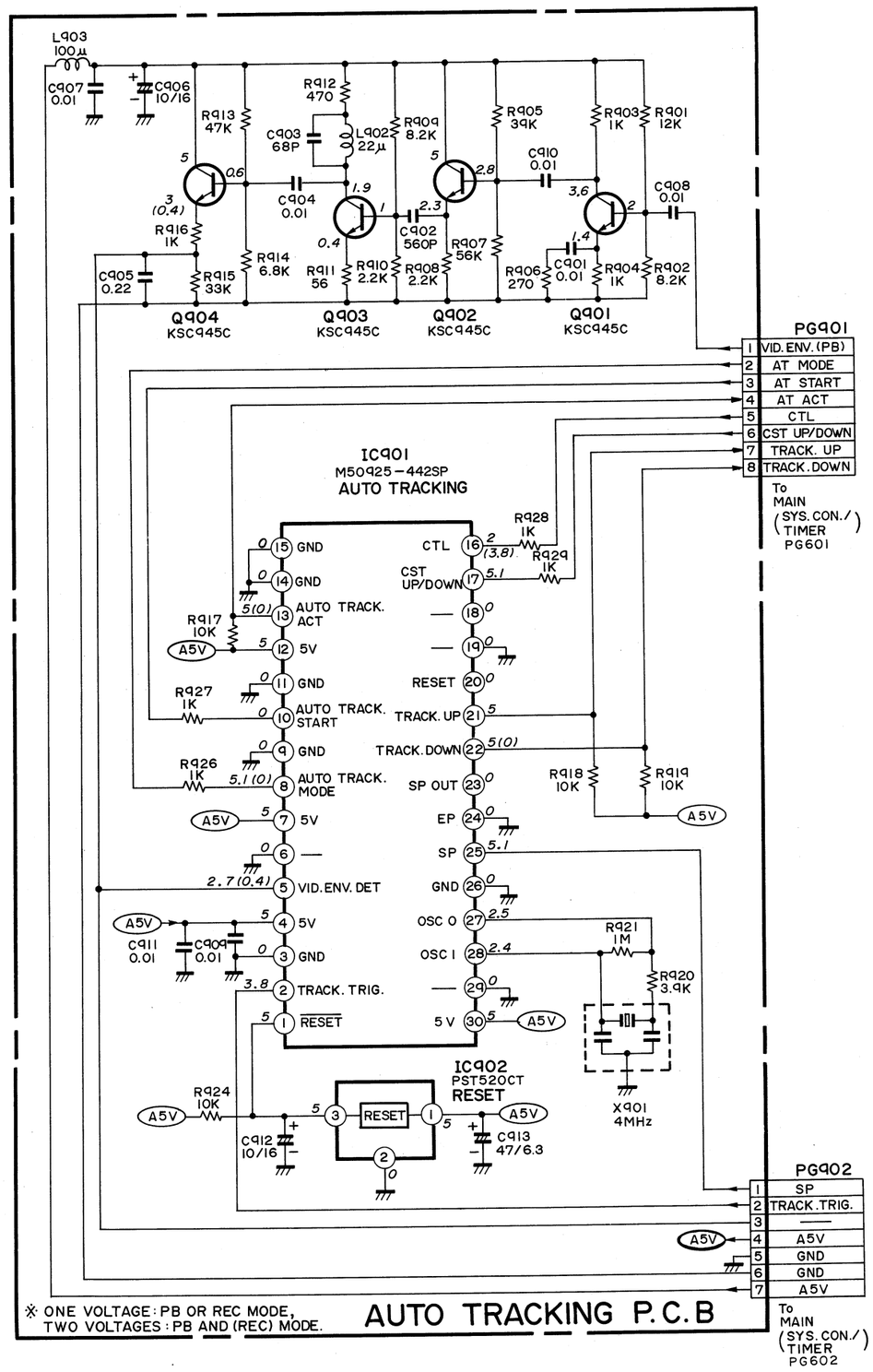


SCHEMATIC DIAGRAM	ITEM
AUDIO	5 – 3
FUNCTION SWITCH	5 – 4
CYL. MOTOR DRIVE	5 – 5
SENSOR	5 – 5
SERVO	5 – 6
SYS. CON./TIMER	5 – 8
REAR JACK	5 – 10
POWER SUPPLY	5 – 12
Y/CHROMA	5 – 16
PRE AMP	5 – 20
CAPSTAN MOTOR	5 – 20
RF CONVERTER (For DS)	5 – 21
RF CONVERTER (For SW, SWM)	5 – 21
RF CONVERTER (For AU, AUB)	5 – 22
REMOTE CONTROL (For DS, SW, SWM, AU)	5 – 22
REMOTE CONTROL (For AUB)	5 – 23
TUNER (For DS)	5 – 24
TUNER (For SW, SWM)	5 – 25
TUNER (For AU, AUB)	5 – 26
IF (For SW, SWM)	5 – 27
IF (For DS)	5 – 27
IF (For AU, AUB)	5 – 28
AUTO TRACKING	5 – 29

AUTO TRACKING CIRCUIT BOARD DIAGRAM



AUTO TRACKING SCHEMATIC DIAGRAM



REPLACEMENT PARTS LIST
ELECTRICAL PARTS LIST

SYMBOL-NO	P-NO	DESCRIPTION
		CAPACITORS
C 201	0201029	CERAMIC CHIP 68PF+-5% 50V
C 205	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C 208	0201022	CERAMIC CHIP 15PF+-5% 50V
C 209	0201001	CERAMIC CHIP 22PF+-5% 50V
C 211	0201028	CERAMIC CHIP 56PF+-5% 50V
C 212	0201012	CERAMIC CHIP 2PF+-0.25% 50V
C 213	0201028	CERAMIC CHIP 56PF+-5% 50V
C 215	0201028	CERAMIC CHIP 56PF+-5% 50V
C 216	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 217	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C 219	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C 222	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C 223	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 224	0201001	CERAMIC CHIP 22PF+-5% 50V
C 225	0201017	CERAMIC CHIP 7PF+-0.5% 50V
C 226	0201001	CERAMIC CHIP 22PF+-5% 50V
C 227	0201036	CERAMIC CHIP 270PF+-5% 50V
C 228	0201028	CERAMIC CHIP 56PF+-5% 50V
C 229	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 230	0201023	CERAMIC CHIP 18PF+-5% 50V
C 231	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C 233	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C 234	0201024	CERAMIC CHIP 27PF+-5% 50V
C 235	0201031	CERAMIC CHIP 100PF+-5% 50V
C 236	0201029	CERAMIC CHIP 68PF+-5% 50V
C 237	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 238	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 239	0201024	CERAMIC CHIP 27PF+-5% 50V
C 242	0256155	ELECTROLYTIC 10UF 16V
C 244	0201001	CERAMIC CHIP 22PF+-5% 50V
C 245	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C 247	0201026	CERAMIC CHIP 39PF+-5% 50V
C 248	0201039	CERAMIC CHIP 470PF+-5% 50V
C 249	0201017	CERAMIC CHIP 7PF+-0.5% 50V
C 250	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C 251	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C 252	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C 305	0201090	CERAMIC CHIP 15PF+-5% 50V
C 306	0201080	CERAMIC CHIP 1PF+-0.25% 50V
C 307	0201054	CERAMIC CHIP 1000PF+-10% 50V
C 309	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C 310	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 311	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 312	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C 314	0201030	CERAMIC CHIP 82PF+-5% 50V
C 315	0201042	CERAMIC CHIP 820PF+-5% 50V
C 318	0201039	CERAMIC CHIP 470PF+-5% 50V
C 320	0201030	CERAMIC CHIP 82PF+-5% 50V
C 322	0201072	CERAMIC CHIP 0.047UF+80-20% 25V
C 323	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C 324	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 325	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 326	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 327	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 328	0201031	CERAMIC CHIP 100PF+-5% 50V
C 329	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C 330	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 331	0201036	CERAMIC CHIP 270PF+-5% 50V
C 332	0201010	CERAMIC CHIP 0.022UF+-20% 25V
C 333	0201039	CERAMIC CHIP 470PF+-5% 50V
C 334	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 335	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 336	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 337	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 338	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 339	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 340	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 341	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 342	0201007	CERAMIC CHIP 0.01UF+-20% 50V
C 344	0201033	CERAMIC CHIP 150PF+-5% 50V
C 345	0201022	CERAMIC CHIP 15PF+-5% 50V
C 354	0201007	CERAMIC CHIP 0.01UF+-20%50V (FOR DS,SW,SWM)
C 355	0201029	CERAMIC CHIP 68PF+-5%50V (FOR DS,SW,SWM)
C 358	0201072	CERAMIC CHIP 0.047UF+80-20%25V
C 363	0201007	CERAMIC CHIP 0.01UF+-20%50V (FOR DS,SW,SWM)
C 412	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C 417	0208379	CERAMIC DISC 0.01UF+-30% 16V
C 419	0204271	POLYESTER FILM 8200PF+-5% 100V
C 420	0890026	CERAMIC DISC 220PF+-10% 50V
C 423	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C 429	0256151	ELECTROLYTIC 1UF 50V
C 611	0890035	CERAMIC DISC 1000PF 50V
C 614	0890008	CERAMIC DISC 10PF+-5% 50V
C 618	0890035	CERAMIC DISC 1000PF 50V
C 619	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C 621	0890022	CERAMIC DISC 100PF+-10% 50V
C 624	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C 626	0890043	CERAMIC DISC 0.01UF+-20% 16V
C 632	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C 751	0256614	ELECTROLYTIC 10UF 16V
C 753	0208379	CERAMIC DISC 0.01UF+-30% 16V
C 755	0208379	CERAMIC DISC 0.01UF+-30% 16V
C 757	0890024	CERAMIC DISC 150PF+-10% 50V
C 758	0890024	CERAMIC DISC 150PF+-10% 50V
C 759	0208379	CERAMIC DISC 0.01UF+-30% 16V
C 761	0208379	CERAMIC DISC 0.01UF+-30% 16V
C 762	0208379	CERAMIC DISC 0.01UF+-30% 16V
C 763	0208379	CERAMIC DISC 0.01UF+-30% 16V
C 764	0239369	CERAMIC DISC 2200PF+-20% 50V
C 765	0890035	CERAMIC DISC 1000PF 50V
C 769	0890118	CERAMIC DISC 22UF+-5% 50V
C 770	0890116	CERAMIC DISC 15PF+-5% 50V
C 772	0208379	CERAMIC DISC 0.01UF+-30% 16V
C 856	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C 857	0256787	ELECTROLYTIC 4700UF 25V
C 859	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C 861	0256861	ELECTROLYTIC 2200UH 16V
C 872	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C 901	0890043	CERAMIC DISC 0.01UF+-20% 16V
C 902	0890032	CERAMIC 560PF+-10% 50V
C 903	0890019	CERAMIC DISC 68PF+-50% 50V
C 904	0890043	CERAMIC DISC 0.01UF+-20% 16V
C 907	0890043	CERAMIC DISC 0.01UF+-20% 16V
C 908	0890043	CERAMIC DISC 0.01UF+-20% 16V
C 909	0890043	CERAMIC DISC 0.01UF+-20% 16V
C 910	0890043	CERAMIC DISC 0.01UF+-20% 16V
C 911	0890043	CERAMIC DISC 0.01UF+-20% 16V
C1402	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1404	0208444	CERAMIC DISC 15PF+-5% 50V
C1405	0208444	CERAMIC DISC 15PF+-5% 50V
C1406	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C1411	0890043	CERAMIC DISC 0.01UF+-20% 16V
C1412	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1414	0890018	CERAMIC DISC 56PF+-50%50V (FOR DS,SW,SWM)

SYMBOL–NO	P–NO	DESCRIPTION
C1512	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1520	0890029	CERAMIC DISC 390PF+-10% 50V
C1522	0208379	CERAMIC DISC 0.01UF+-30% 16V
C1526	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1528	0208379	CERAMIC DISC 0.01UF+-30% 16V
C1529	0208379	CERAMIC DISC 0.01UF+-30% 16V
C1531	0890074	CERAMIC DISC 100PF+-5% 50V
C1532	0208464	CERAMIC DISC 100PF+-5% 50V
C1533	0890018	CERAMIC DISC 56PF+-50% 50V
C1534	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1553	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1560	0890015	CERAMIC DISC 33PF+-50% 50V
C1576	0890035	CERAMIC DISC 1000PF 50V
C1578	0890037	CERAMIC DISC 2200PF+-20% 16V
C1580	0256614	ELECTROLYTIC 10UF 16V
C1654	0890045	CERAMIC DISC 0.047UF+80-20% 50V
		RESISTORS
R 201	0103842	CHIP RESISTOR 8200HM+-5% 0.1W
R 202	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R 203	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 204	0103830	CHIP RESISTOR 820HM+-5% 0.1W
R 205	0103827	CHIP RESISTOR 470HM+-5% 0.1W
R 206	0103839	CHIP RESISTOR 4700HM+-5% 0.1W
R 207	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 208	0103838	CHIP RESISTOR 3900HM+-5% 0.1W
R 209	0103839	CHIP RESISTOR 4700HM+-5% 0.1W
R 210	0103839	CHIP RESISTOR 4700HM+-5% 0.1W
R 211	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R 212	0103848	CHIP RESISTOR 2.7KOHM+-5% 0.1W
R 215	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 216	0103839	CHIP RESISTOR 4700HM+-5% 0.1W
R 217	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 218	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 219	0103845	CHIP RESISTOR 1.5KOHM+-5% 0.1W
R 220	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 221	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 222	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 223	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 224	0103858	CHIP RESISTOR 18KOHM+-5% 0.1W
R 225	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 226	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R 227	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 228	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 229	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 230	0103840	CHIP RESISTOR 5600HM+-5% 0.1W
R 231	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 232	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 233	0103835	CHIP RESISTOR 2200HM+-5% 0.1W
R 237	0103840	CHIP RESISTOR 5600HM+-5% 0.1W
R 239	0103840	CHIP RESISTOR 5600HM+-5% 0.1W
R 301	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 302	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 303	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R 304	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 305	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R 306	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 307	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R 308	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 309	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 310	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W
R 311	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W
R 312	0103861	CHIP RESISTOR 33KOHM+-5% 0.1W
R 313	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W

SYMBOL–NO	P–NO	DESCRIPTION
R 314	0103855	CHIP RESISTOR 10KOHM+-5% 0.1W
R 315	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 317	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 318	0103836	CHIP RESISTOR 2700HM+-5% 0.1W
R 319	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 320	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R 321	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 322	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 323	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 324	0103864	CHIP RESISTOR 56KOHM+-5% 0.1W
R 325	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 326	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R 327	0103850	CHIP RESISTOR 3.9KOHM+-5% 0.1W
R 328	0103863	CHIP RESISTOR 47KOHM+-5% 0.1W
R 329	0103857	CHIP RESISTOR 15KOHM+-5% 0.1W
R 330	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R 331	0103846	CHIP RESISTOR 1.8KOHM+-5% 0.1W
R 332	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R 333	0103849	CHIP RESISTOR 3.3KOHM+-5% 0.1W
R 334	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 335	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W
R 336	0103844	CHIP RESISTOR 1.2KOHM+-5% 0.1W
R 337	0103851	CHIP RESISTOR 4.7KOHM+-5% 0.1W
R 351	0103843	CHIP RESISTOR 1KOHM+-5% 0.1W (FOR DS,SW,SWM)
R 352	0103869	CHIP RESISTOR 150KOHM+-5% 0.1W (FOR DS,SW,SWM)
R 353	0103847	CHIP RESISTOR 2.2KOHM+-5% 0.1W (FOR DS,SW,SWM)
R 354	0103829	CHIP RESISTOR 680HM+-5% 0.1W (FOR DS,SW,SWM)
R 355	0103859	CHIP RESISTOR 22KOHM+-5% 0.1W (FOR DS,SW,SWM)
⚠ R 851	0101724	RESISTOR 8.2 OHM 1/4W
RT 201	5006234	SEMI VARIABLE 1KOHM
RT 202	5006235	SEMI VARIABLE 2.2KOHM
RT 301	5006236	SEMI VARIABLE 4.7KOHM
RT 302	5030008	SEMI VARIABLE 22KOHM
RT 351	5006233	SEMI VARIABLE 4700HM (FOR DS,SW,SWM)
RT 401	5030011	SEMI VARIABLE 100KOHM
RT 601	5030013	SEMI VARIABLE 470KOHM
		SEMI-CONDUCTORS
D 141	5380933	LED GL-451
D 201	5339491	DIODE 1N4531
D 202	5328301	DIODE MA151WK (MT)
D 601	5339491	DIODE 1N4531
D 751	5339491	DIODE 1N4531
D 752	5339491	DIODE 1N4531
D 753	5339491	DIODE 1N4531
D 754	5339491	DIODE 1N4531
D 755	5339491	DIODE 1N4531
D 756	5339491	DIODE 1N4531
D 758	5339491	DIODE 1N4531(FOR SW,SWM)
D 759	5339491	DIODE 1N4531(FOR SW,SWM)
D 760	5339491	DIODE 1N4531
⚠ D 851	5333351	DIODE D3SBA10
⚠ D 852	5339231	DIODE 1SR35-100A
⚠ D 853	5339231	DIODE 1SR35-100A
⚠ D 854	5339231	DIODE 1SR35-100A
⚠ D 855	5339231	DIODE 1SR35-100A
D 856	5339171	DIODE 1SS130
D 857	5339171	DIODE 1SS130

SYMBOL–NO	P–NO	DESCRIPTION
D 858	5339491	DIODE 1N4531
D 859	5339491	DIODE 1N4531
D 861	5339231	DIODE 1SR35-100A
D1401	5339491	DIODE 1N4531
D1403	5339491	DIODE 1N4531(FOR DS,SW,SWM)
D1501	5339491	DIODE 1N4531(FOR AU,AUB)
D1502	5339491	DIODE 1N4531
D1503	5339491	DIODE 1N4531
D1506	5339491	DIODE 1N4531
D1508	5339491	DIODE 1N4531
D1509	5339491	DIODE 1N4531
D1510	5339491	DIODE 1N4531
IC 141	5391282	IC DN6851
IC 201	1372134	IC HT7207C
IC 202	5362263	IC MSM6965RS
IC 301	1351511	IC M52057FP
IC 351	5366642	IC XRA7025L (FOR DS,SW,SWM)
IC 401	1341472	IC LA7297
IC 601	1360391	IC HD49747N
IC 602	5367221	IC BA6993
IC 751	1355132	IC CXP50112-110Q
IC 753	5300795	IC XRA6209U4
IC 754	1340002	IC S-8053ALB
IC 755	5301561	IC M6M80021P
IC 851	5364309	IC RC78M05E
IC 852	1342612	IC RC78M12FA
IC 901	5302374	IC M50925-422SP
IC 902	1340112	IC PST520C-2T
IC1401	1361441	IC UPD6450C
IC1501	1341331	IC LA7938
IC1651	1360071	IC BA6459P1
Q 211	5326273	TRANSISTOR MMBC1623L56
Q 212	5326273	TRANSISTOR MMBC1623L56
Q 213	5326273	TRANSISTOR MMBC1623L56
Q 214	5326273	TRANSISTOR MMBC1623L56
Q 215	5326273	TRANSISTOR MMBC1623L56
Q 216	5326273	TRANSISTOR MMBC1623L56
Q 217	5326273	TRANSISTOR MMBC1623L56
Q 311	5326273	TRANSISTOR MMBC1623L56
Q 312	5326273	TRANSISTOR MMBC1623L56
Q 401	5327101	TRANSISTER 2SC3553BC
Q 601	1321341	TRANISITOR 2SD1765
Q 851	5327031	TRANSISTOR 2SA673C
Q 854	1321341	TRANISITOR 2SD1765
Q 855	1321341	TRANISITOR 2SD1765
Q 901	5327241	TRANSISTOR KSC945C (G)
Q 902	5327241	TRANSISTOR KSC945C (G)
Q 903	5327241	TRANSISTOR KSC945C (G)
Q 904	5327241	TRANSISTOR KSC945C (G)
Q1401	5327241	TRANSISTOR KSC945C (G)
Q1402	5327241	TRANSISTOR KSC945C (G)
Q1404	5327241	TRANSISTOR KSC945C (G)
Q1405	5327001	TRANSISTOR 2SC458CD (FO DS,SW,SWM)
Q1407	5327021	TRANSISTOR 2SA844CD
Q1501	5327031	TRANSISTOR 2SA673C
Q1507	5324222	TRANSISTOR 2SA933(S) (FOR AU,AUB)
Q1509	5327001	TRANSISTOR 2SC458CD
Q1510	5327241	TRANSISTOR KSC945C (G)
Q1524	5327031	TRANSISTOR 2SA673C
Q1525	5327031	TRANSISTOR 2SA673C
Q1526	5327231	TRANSISTOR 2SC1741QR
Q1552	5327031	TRANSISTOR 2SA673C
QR 201	5328793	TRANSISTOR DTC144K-26
QR 202	5328793	TRANSISTOR DTC144K-26
QR 203	5328791	TRANSISTOR DTC124K(25)
QR 204	5328791	TRANSISTOR DTC124K(25)
QR 205	5328791	TRANSISTOR DTC124K(25)
QR 301	5328793	TRANSISTOR DTC144K-26
QR 302	5328793	TRANSISTOR DTC144K-26
QR 303	5328793	TRANSISTOR DTC144K-26
QR 304	5328791	TRANSISTOR DTC124K(25)
QR 305	5328793	TRANSISTOR DTC144K-26
QR 306	5328791	TRANSISTOR DTC124K(25)
QR 307	5328793	TRANSISTOR DTC144K-26
QR 601	5327073	TRANSISTOR DTC144ES
QR 602	5327074	TRANSISTOR DTA144ES
QR 751	5327073	TRANSISTOR DTC144ES
QR 752	5327073	TRANSISTOR DTC144ES
QR 753	5327073	TRANSISTOR DTC144ES
QR 755	5327073	TRANSISTOR DTC144ES
QR 757	5327073	TRANSISTOR DTC144ES (FOR SW,SWM)
QR 758	5327073	TRANSISTOR DTC144ES (FOR SW,SWM)
QR 759	5327073	TRANSISTOR DTC144ES (FOR SW,SWM)
QR 853	5327073	TRANSISTOR DTC144ES
QR1403	5327073	TRANSISTOR DTC144ES
QR1409	5327073	TRANSISTOR DTC144ES
QR1502	5327073	TRANSISTOR DTC144ES
QR1508	5327073	TRANSISTOR DTC144ES (FOR AU,AUB)
QR1511	5327073	TRANSISTOR DTC144ES
QR1522	5327073	TRANSISTOR DTC144ES
QR1523	5327073	TRANSISTOR DTC144ES
QR1524	5327074	TRANSISTOR DTC144ES
ZD 601	5339263	ZENER DIODE HZS7-A1
ZD 602	5339263	ZENER DIODE HZS7-A1
ZD 603	5339263	ZENER DIODE HZS7-A1
ZD 604	5339274	ZENER DIODE HZS15-3
ZD 751	5339263	ZENER DIODE HZS7-A1
ZD 752	5339262	ZENER DIODE HZS6-C2
ZD 753	5339271	ZENER DIODE HZS9A2
ZD 754	5339274	ZENER DIODE HZS15-3
ZD 851	5339256	ZENER DIODE HZS30
ZD 853	5339277	ZENER DIODE HZS6A2
ZD 854	5339266	ZENER DIODE HZS5C-1
ZD 855	5339259	ZENER DIODE HZS9-C3
ZD 856	5339291	ZEBER DIODE HZS3B1
ZD1501	5339267	ZENER DIODE HZS7-B
ZD1502	5350611	IC UPC574J

COILS

L 201	5159149	CHOKE COIL 47UH
L 202	5159083	CHOKE COIL 270UH
L 203	5159145	CHOKE COIL 22UH
L 204	5159151	CHOKE COIL 56UH
L 205	5159144	CHOKE COIL 18UH
L 206	5159144	CHOKE COIL 18UH
L 207	5159147	CHOKE COIL 33UH
L 208	5159077	CHOKE COIL 100UH+-10%
L 209	5159077	CHOKE COIL 100UH+-10%
L 210	5159145	CHOKE COIL 22UH
L 211	5159156	CHOKE COIL 150UH
L 212	5159153	CHOKE COIL 82UH
L 213	5159153	CHOKE COIL 82UH
L 214	5159077	CHOKE COIL 100UH+-10%
L 215	5159141	CHOKE COIL 10UH
L 216	5159077	CHOKE COIL 100UH+-10%
L 301	5159149	CHOKE COIL 47UH
L 302	5159077	CHOKE COIL 100UH+-10%
L 303	5159077	CHOKE COIL 100UH+-10%
L 304	5159148	CHOKE COIL 39UH

SYMBOL–NO	P–NO	DESCRIPTION
L 305	5159154	CHOKE COIL 100UH
L 306	5159143	CHOKE COIL 15UH
L 307	5159088	CHOKE COIL 680UH
L 308	5159084	CHOKE COIL 330UH
L 309	5159084	CHOKE COIL 330UH
L 310	5159077	CHOKE COIL 100UH+-10%
L 311	5159154	CHOKE COIL 100UH
L 312	5159149	CHOKE COIL 47UH
L 351	5130431	COIL (FO DS,SW,SWM)
L 352	5159077	CHOKE COIL 100UH+-10%
		(FOR DS,SW,SWM)
L 401	5159113	COIL,CHOKE 8.2MH
L 402	5159081	CHOKE COIL 180UH+-10%
L 902	5159145	CHOKE COIL 22UH
L 903	5159077	CHOKE COIL 100UH+-10%
L1401	5159077	CHOKE COIL 100UH+-10%
L1402	5159077	CHOKE COIL 100UH+-10%
L1403	5121289	COIL 22UH (FOR DS,SW,SWM)
L1502	5159077	CHOKE COIL 100UH+-10%
L1505	5159077	CHOKE COIL 100UH+-10%
L1510	5152337	CHOKE COIL 100UH+-10% (FOR AU,AUB)
		TRANSFORMER
T 401	5262545	OSCILLATOR,BIAS
		CRYSTALS
X 201	5778181	OSCILLATOR
X 301	5784551	OSCILLATOR
X 751	5781592	CRYSTAL
X 752	5783001	CRYSTAL
X 901	5784472	OSCILLATOR
X1401	5784511	CRYSTAL 17.734MHZ

SYMBOL–NO	P–NO	DESCRIPTION
		MISCELLANEOUS
CP 201	5163955	FILTER
CP 202	5163533	FILTER
CP 203	5163805	LC FILTER
CP 301	5163792	LC FILTER
CP 302	5165051	FILTER
CP 303	5785388	DELAY LINE
CP 304	5162642	DELAY LINE
CP 351	5160431	BAND PASS FILTER(FOR DS,SW,SWM)
CP1401	5163372	FILTER
IR1751	5317191	MODULE,INF
J1501	5690295	PLATE,JACK
BL1401	5272373	LINE FILTER
DG 751	5315172	FLUORESCET INDICATORTUBE
⚠ FU851	5720174	FUSE 630MA
⚠ FU852	5721061	FUSE 1.6A
⚠ FU853	5720174	FUSE 630MA
S 141	5635321	SWITCH
S 142	5635331	SWITCH
⚠ S 851	5605341	SWITCH (FOR DS,SW,SWM)
S1501	5622562	SWITCH (FOR DS)
S1751	5635061	SWITCH
S1752	5635061	SWITCH
S1753	5635061	SWITCH
S1754	5635061	SWITCH
S1755	5635061	SWITCH
S1756	5635061	SWITCH
S1758	5635061	SWITCH

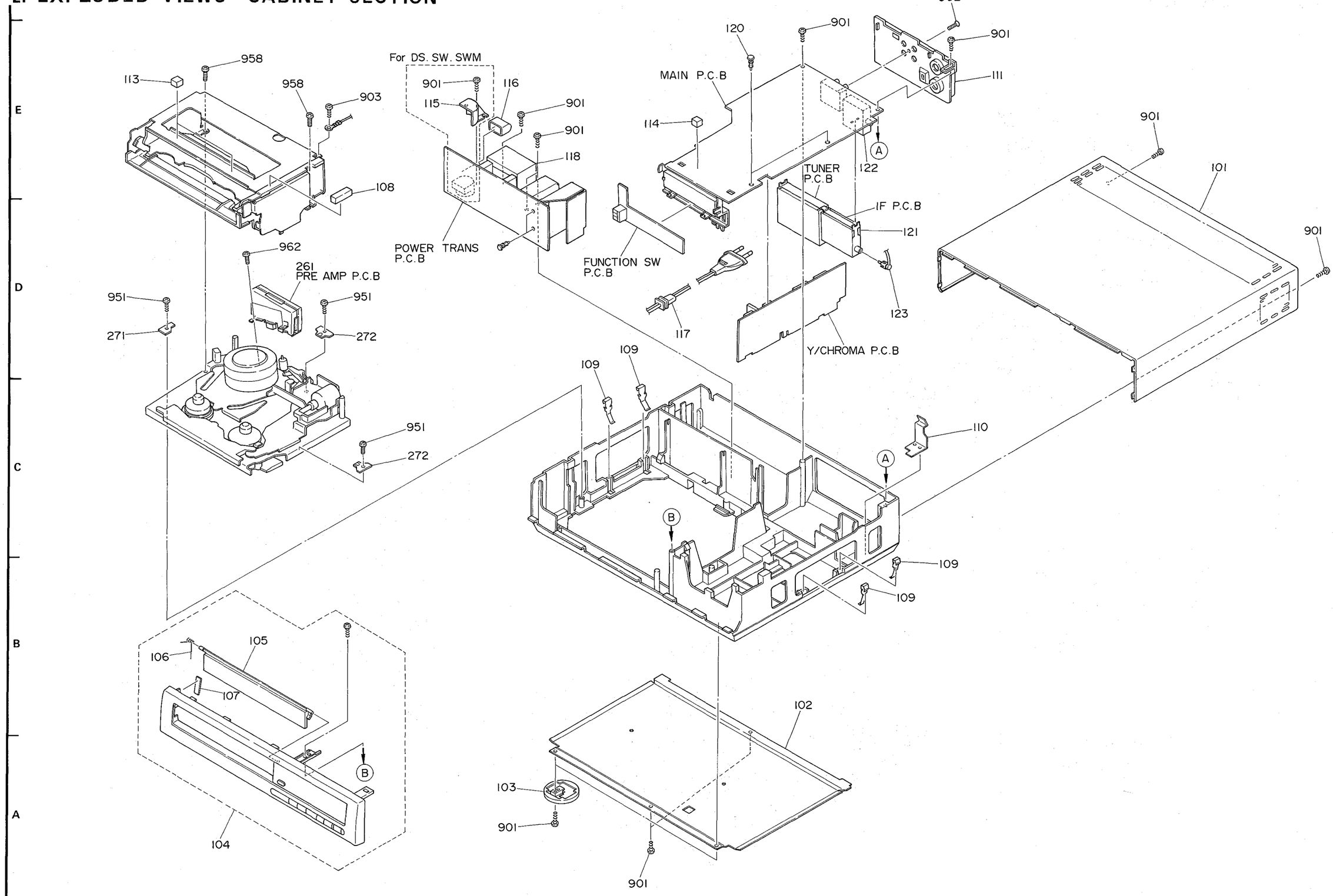
MECHANICAL PARTS LIST

SYMBOL–NO	P–NO	DESCRIPTION
		FOR FINAL ASSEMBLY
101	6006923	COVER,TOP
102	6006933	COVER,BOTTOM
103	6442461	INSULATOR
104	6485581	PANEL,FRONT (FOR AU,AUB)
104	6485585	PANEL,FRONT (FOR DS,SW,SWM)
105	6485084	DOOR,CONTROL
106	6552333	SPRING
107	7708382	STOPPER
108	7744332	FELT
109	6527682	SPRING
110	6528141	PLATE
111	6485911	PANEL,REAR (FOR DS)
111	6485912	PANEL,REAR (FOR SW,SWM)
111	6485913	PANEL,REAR (FOR AU,AUB)
113	6562611	CUSHION,RUBBER
114	6562614	CUSHION,RUBBER
115	6814981	PIECE (FOR DS,SW,SWM)
116	6407471	COVER,FUSE
⚠ 117	5746784	CORD,POWER (FOR AU,AUB)
⚠ 117	5851111	CORD,POWER (FOR DS,SW,SWM)
⚠ 118	5214264	TRANSFORMER,POWER (FOR AU,AUB)
⚠ 118	5214401	TRANSFORMER,POWER (FOR DS,SW,SWM)
119	6814111	HOLDER (FOR SW,SWM)
119	6814112	HOLDER (FOR DS,AU,AUB)
120	6714211	NYLON RIVET - 3MMD
121	5588781	TUNER IF BLOCK (FOR DS)
121	5588801	TUNER IF BLOCK (FOR SW,SWM)
121	5588821	TUNER IF BLOCK (FOR AU,AUB)
122	5589411	CONVERTER,RF (FOR DS)
122	5589431	CONVERTER,RF (FOR SW,SWM)
122	5589451	CONVERTER,RF (FOR AU,AUB)
123	5885997	CORD
202	6915922	SCREW
203	7469871	BASE
204	5434061	HEAD
205	6304906	SPRING
206	6522752	SPRING
207	7785673	NUT
208	6820341	ARM
209	6555501	SPRING
210	6416121	SPRING
211	7789123	POLYSLIDER WASHER
212	6416131	REEL TABLE,TAKE UP
213	7789122	POLYSLIDER WASHER
214	6384352	ARM,PRESSER ROLLER
215	6805041	SLIDER BLOCK
216	7412822	PLATE
217	7429651	GEAR,LOADING(L)
218	7429661	GEAR,LOADING(R)
219	6911551	GUIDE ROLLER BASE(IN)
220	6424261	ROLLER,GUIDE
221	6911572	GUIDE ROLLER BASE(OUT)
222	6897071	BASE
223	5445851	HEAD FULL ERASE
225	4508237	GUIDE,TAPE
226	6555431	SPRING
227	7413665	HOLDER-BAND
228	7412863	ARM
229	6555444	SPRING
230	6897265	BRACKET
231	6896752	ARM
232	6555061	SPRING
233	6820351	ARM
235	7468853	BLOCK,LOADING
236	7398631	BRACKET
237	7412881	ARM
238	6976551	ARM
239	7412893	ARM
240	7412872	ARM
241	6897241	ARM
242	6551151	SPRING
243	6804792	BRAKE
244	6896895	HOLDER,MOTOR
245	6896852	ARM
246	6897251	ARM
247	6555483	SPRING
248	6897271	ARM
249	6897065	GEAR,MODE
250	6434861	WORM WHEEL
251	6555052	SPRING
252	7799012	WASHER
255	4508235	GUIDE
261	4130273	PWB ASSY PRE-AMP
271	7429631	BRACKET
272	7429641	BRACKET
273	7472121	ARM
274	6300602	SPRING
275	7788348	WASHER
276	7472091	BRACKET
301	5571741	MOTOR,CAPSTAN
302	6804831	CLUCTH BASE ASSY
303	6351555	BELT
304	6897095	ARM,FF/REW
305	6434852	RACK
402	6804982	BRACKET
403	6804962	BRACKET
404	6896971	WORM WHEEL ASSY
405	6435571	WORM
406	4508221	WORM SHAFT
407	6804992	BRACKET
408	6896632	ARM-SWITCH
409	6302474	SPRING
410	6897041	ARM-SWITCH
411	7412583	BRACKET-GEAR
412	7449177	HOLDER,CASSETTE
413	7449163	BASE,HOLDER
414	6896664	HOLDER,CASSETTE (R)
415	7428113	HOLDER,STAY
416	6820361	ARM
417	6897001	ARM
418	6556241	SPRING
419	6896673	HOLDER,CASSETTE (L)
420	7412944	ARM
421	6555772	SPRING
422	7412953	SPRING
423	6806531	HOLDER,FRONT
424	7580791	SHAFT ASSY
425	7412552	BRACKET,SIDE(L)
426	7794391	WASHER
501	5436101	UPPER CYLINDER (CY-Z2P)
502	5436312	CYLINDER,LOWER(CY-Z2PV)
503	5792635	BRUSH,CYLINDER
901	8699410	SCREW(3X10)
902	7781582	FLAT SCREW-3MMDX10MM(BLACK)
903	8699412	SCREW (3X12) BLACK
951	8691410	SCREW
952	8691308	BT SCREW-2.6MMDX8MM
953	8699408	SCREW

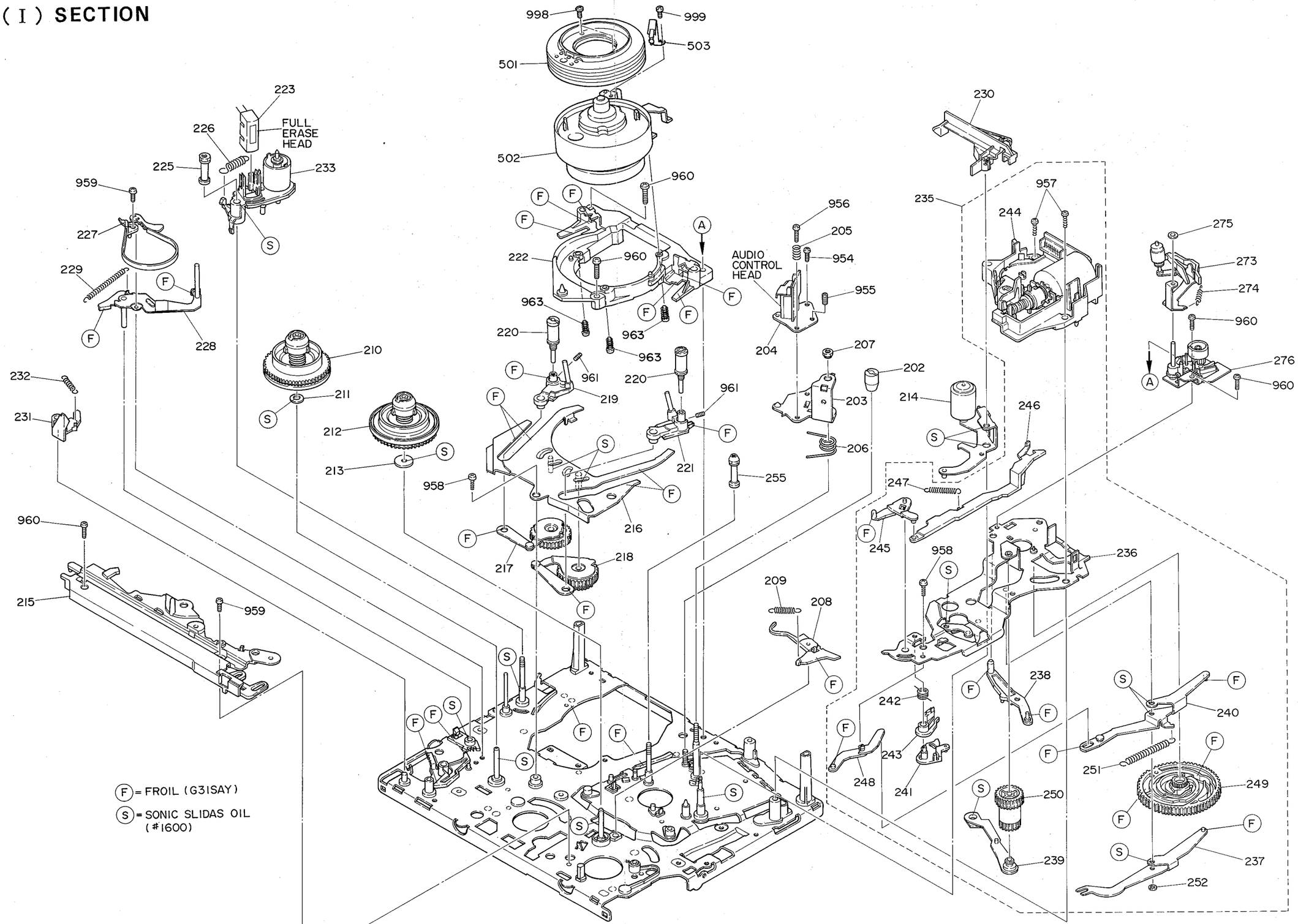
SYMBOL–NO	P–NO	DESCRIPTION
954	7781872	SCREW-3MMDX8MM
955	7773086	SCREW
956	8741414	SCREW (3X14)
957	8691412	SCREW (3X12)
958	8691408	SCREW (3X8)
959	8711406	SCREW - 3X6 PAN HEADSCREW
960	8741412	SCREW (B3X12)
961	7785941	SCREW
962	8711404	SCREW - 3X4 PAN HEADSCREW
963	7775581	SCREW(M3X14)
998	7784131	SCREW(3X8)
999	8711405	SCREW(3X5)
		FOR ACCESSORIES
802	5860411	CONNECTER CORD (FOR DS,AU,AUB)
802	5898876	CONNECTER CORD (FOR SW,SWM)
803	5614752	REMOTE HAND SET (FOR AUB)
803	5614791	REMOTE HAND SET (FOR DS,SW,SWM)
803	5614792	REMOTE HAND SET (FOR AU)
804	5652291	SOCKET ADAPTER (FOR DS)

SYMBOL–NO	P–NO	DESCRIPTION

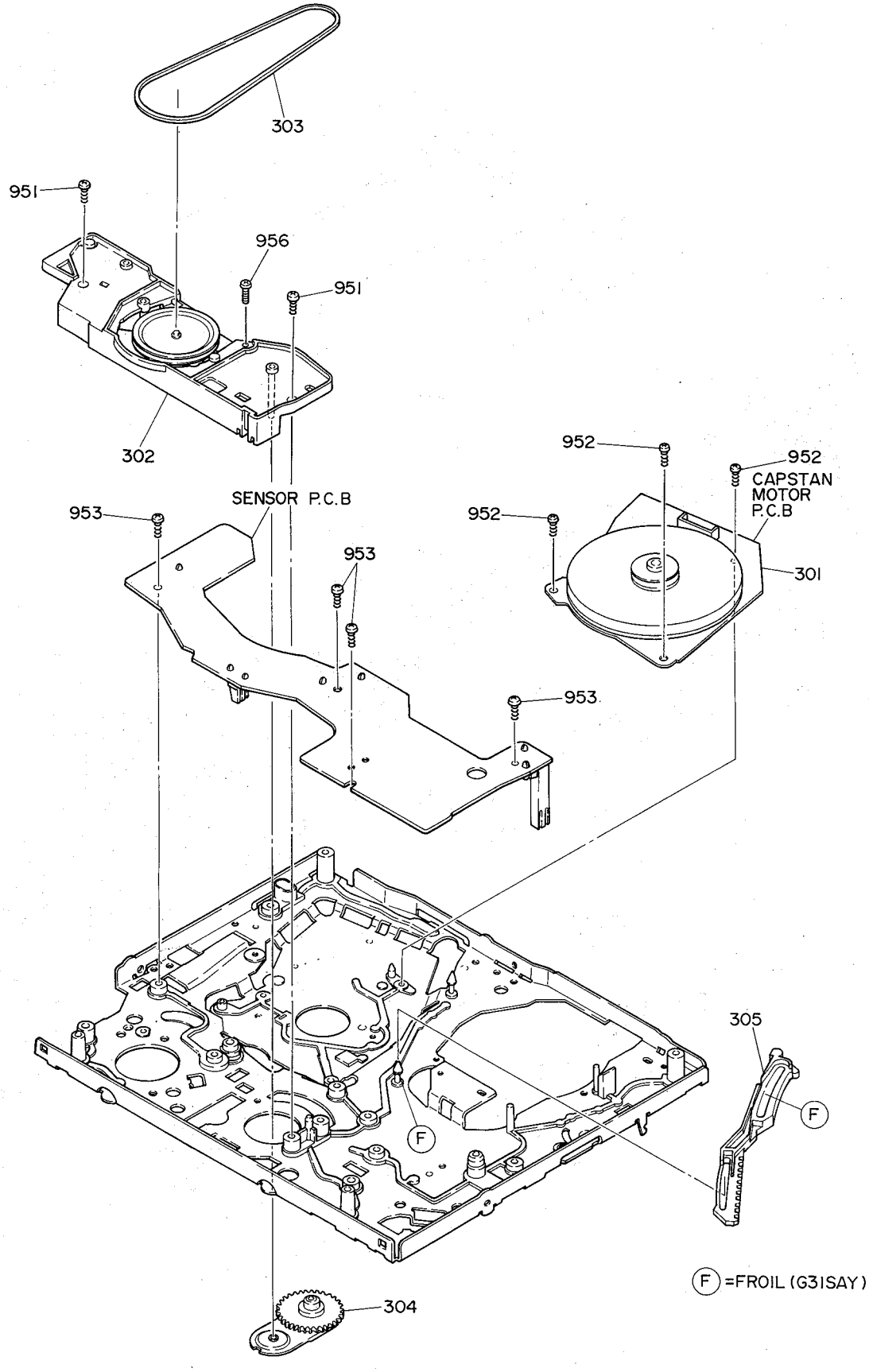
2. EXPLODED VIEWS CABINET SECTION



CHASSIS (I) SECTION



CHASSIS (Ⅱ) SECTION



CASSETTE LOADING MECHANISM SECTION